BUILD AN AMD PC: A88X BOARDS ON TEST

a+pc

YOUR EXPERT GUIDE

May 2014
Issue 402

FREE DISC INSIDE
MAINTAIN AND OPTIMISE YOUR PC,
SIMPLIFY TASKS WITH HOTKEYS,
A SIMPLE ALARM CLOCK FOR YOUR PC
+ VIDEO-EDITING ESSENTIALS & MORE!

Videos - Title
The Lord of the Rings: The Return of the King
Movie Details
Action / Adventure / Fantasy
2003
201 Minutes
Rating : 8.9 (697,476 votes)
Director
Peter Jackson
Writer
J.R.R. Tolkien / Fran Walsh
Plot
While Frodo & Sam continue to approach Mount Doom to destroy the One Ring, unaware of the path Gollum is leading them, the former Fellowship aid Rohan & Gondor in a great battle in the Pelennor Fields, Minas Tirith and the Black Gates as Sauron wages his last war against Middle-Earth.
SD
xvid
AAC 2.0
16:9
PG-13
SAMSUNG
Wireless PC remote
Media PC
SURVIVAL

OLD GEAR: NEW TRICKS

ON'T LET YOUR OLD TECH GO TO WASTE!
EPURPOSE YOUR UNUSED SMARTPHONE
R PC WITH OUR HOW-TO GUIDES

PROJECTS
- CREATE A KILLER MEDIA PC
- BUILD A CENTRAL HUB FOR YOUR MUSIC
- RE-USE OLD ANDROIDS AS SECURITY CAMS
- RETRO GAMING MACHINE

EEP WINDOWS P FOREVER
licrosoft's support ay have ended but at doesn't mean ou have to ditch it

NDISPENSIBLE IOW-TOS
Browse securely on your Android phone
DIY Nvidia Shield
Chromecast alternatives

HOW TO

HOST YOUR OWN CLOUD
Get your files anywhere, securely

NVIDIA'S NEW LAPTOP GPUs
Can gaming bliss finally come to ultrabooks?

AUSTRALIA $9.95 • NEW ZEALAND $10.90 INC GST
PRINT POST APPROVED: 100000179 • ISSN: 0728-4415

Future

05
9 313006 001362

See why Radeon™ is gaming at **amd.com/R9**

© 2014 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, Radeon, and combinations thereof are trademarks of Advanced Micro Devices, Inc. PID 54658A

AMD

The World's Fastest Graphics Card.*

AMD Radeon™ R9 295X2 Graphics.
Engineered for ultimate performance.

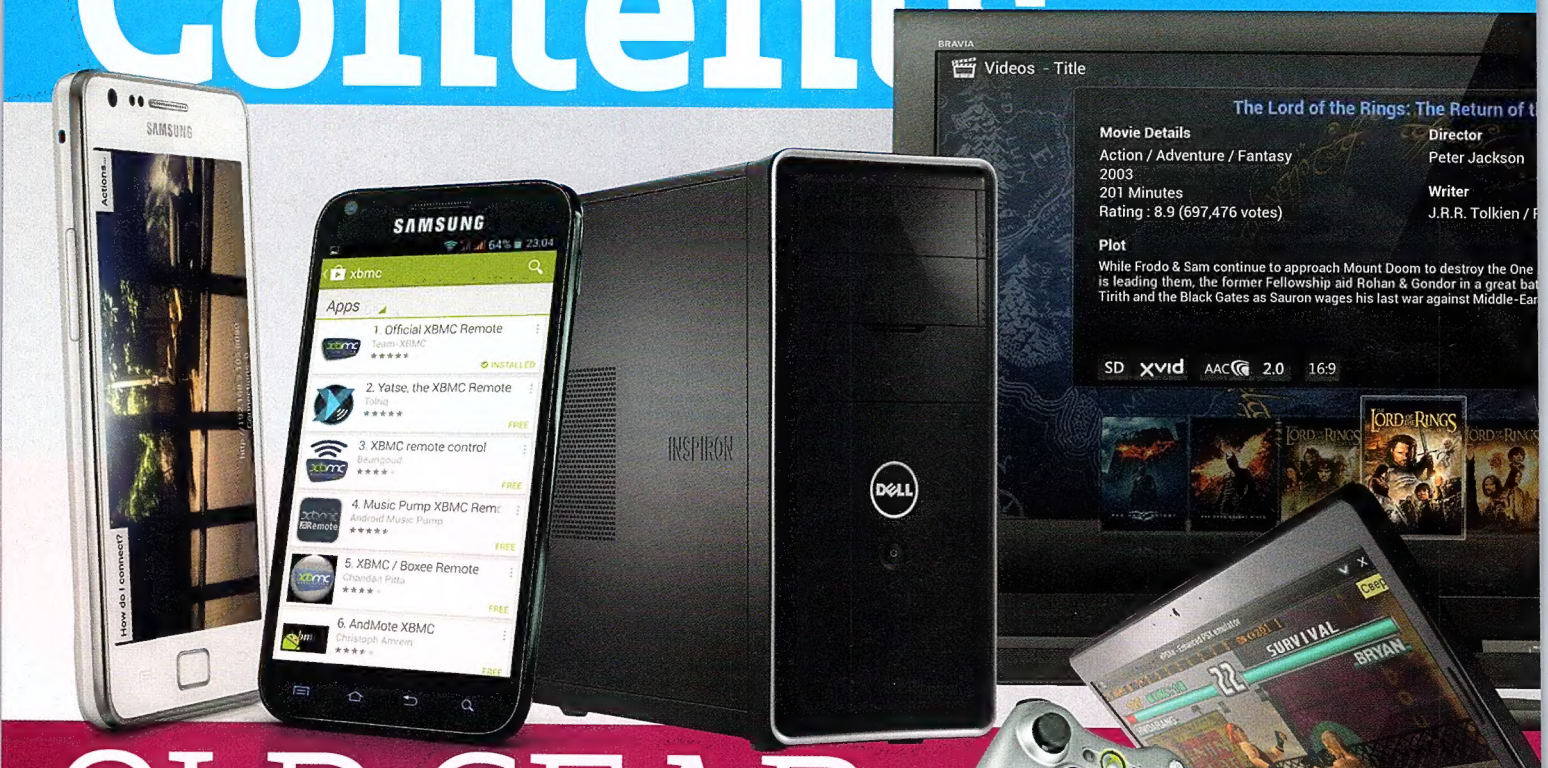
AMD RADEON R9 SERIES

AMD GAMING EVOLVED

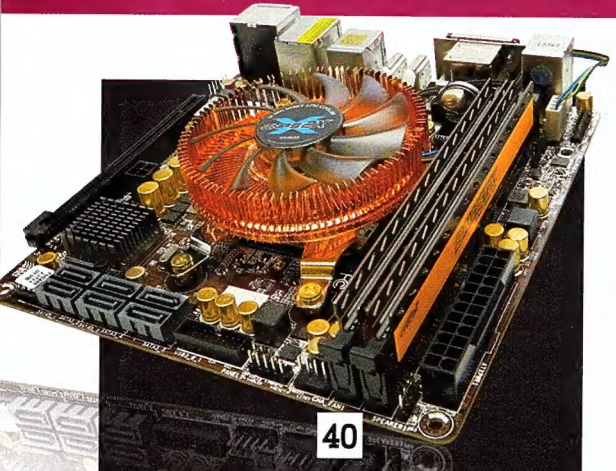
*In a 3DMark Fire Strike benchmark test in 1080p, the AMD Radeon™ R9 295X2 outperforms the Titan Black, Nvidia's highest performing graphics card as of March 12, 2014, by a score of 15,862 to 9,878 in the Performance preset, and 8,764 to 4,725 using the Extreme preset. Test system: Intel i7 4960X CPU, 16GB memory, Nvidia driver 334.89, AMD Catalyst driver 14.10 and Windows 8.1. GRDT-36

Contents

Issue 402 May 2014



54 OLD GEAR: NEW TRICKS



40 COOKING UP A KILLER KAVERI RIG

APUS LIKE KAVERI ARE THE FUTURE FOR AMD, RECKONS JEREMY LAIRD, AND THERE ARE ALREADY PLENTY OF COMPATIBLE MOTHERBOARDS TO CHOOSE FROM.

» features

55 PROJECTS FOR OLD PCS AND LAPTOPS
A selection of different things you can do to resurrect your old PCs and laptops.

77 PROJECTS FOR SMARTPHONES AND TABLETS
Don't leave your old phones and tablets in a drawer gathering dust. Brush them off and put them back to work.

» technotes

8 NEWS
The latest developments in the tech world.

12 GADGETS
Hot tech gear we want to own.

14 EPINIONS
See what APC's readers have to say.

16 END USER
Not everyone is computer literate.

"Players of the *APC* drinking game should take a dram now, because we're ranting about the NSA and its mates." Host your own cloud server, P68

30 LG G FLEX

26 ARMAGEDDON ALIEN G9X

21 GIGABYTE GA-Z87X-OC

26 ASUS CERBERUS

28 RAZER BLACKWIDOW ULTIMATE

20 SAPPHIRE DUAL-X RADEON R7 265

30 SONY XPERIA Z1 COMPACT

» the lab

18 LATEST REVIEWS

18 Gigabyte P34G
19 MSI GS70 Stealth
20 MSI GTX 750 Ti Gaming 2GB
20 Sapphire Dual-X Radeon R7 265
21 ASRock Fatal1ty B85 Killer
21 Gigabyte GA-Z87X-OC
22 Acer Iconia A1-830
24 ioSafe 214
25 Fritz!Box 7490
26 Armageddon Alien IV G9X
26 ASUS Cerberus Gaming Headset
28 CM Storm Mech
28 Razer BlackWidow Ultimate
29 BenQ XL2720Z
30 LG G Flex
30 Sony Xperia Z1 Compact

34 SOFTWARE REVIEWS

» how to

86 QUICK TIPS

We fix readers' computing problems.

88 TUTORIALS

88 Keep Windows XP forever
92 Push Android notifications to your Linux PC
94 Make OS X's Sidebar your own
96 Better e-reading on iOS
98 Browse securely on your Android phone
100 Display information upfront with an Excel splash screen

102 MASTERCLASSES

102 Arduino: The Rolly Mk. II Robot
106 Android: The Chromecast alternatives

» downtime

110 GAMES

High-performance playtime.

114 CHIP CHAT

News from the world of geekdom.

» on the disc

» Ashampoo WinOptimizer 2014
» 1-abc.net Hotkey Organizer
» Abelssoft AbAlarm
» Video-editing essential toolkit
» Oolite: full sci-fi game

Find your disc inside on page 51.

The greatest remake

APC's editor considers the trials and tribulations of finding what to do with your disused tech.

This month's cover story grew out of a problem that I'm sure every *APC* reader has struggled with – what to do with your old bits of tech. The rapid pace of change and new product releases in the tech sphere is one of its greatest attractions, but it once you've been at it for a dozen or more years it sure does result in a large collection of still-working gadgets and gear that have no where to go. While I'm sure most of us give away what we can, there's often a hidden cost to taking that road – you become tech support forever after for that particular device.

As a fairly avid PC builder (though "serial upgrader" might be a more accurate description), figuring out what to do with PCs and PC components has been particularly vexing. In the past, my wife has often benefitted from an "upgrade" at the same time I have in that she inherits (most of) my previous PC whenever I build a new system. She's since switched to using a MacBook as her main machine – yes, we're staunchly format-agnostic in the Gardiner household – and docking it to a bigger monitor and keyboard when the need arises. That's left me with a variety of PC parts and sometimes whole systems that I'm not sure what to do with. Having those spare bits can be a good way to spur you to build something great, however – something that I've found myself. The media PC that now sits in our lounge room is largely made up of scavenged PC parts taken from previous systems, but even though it's a bit of a frankenstein it's become perhaps the most critical PC in our entire house – well, at least when it comes to keeping everyone entertained.

I'd take an even bet that most *APC* readers would have at least a modest collection of old tech gear that they're finding hard to let go of – we part with good money for gadgets and PC components (yes, even *APC* editors must buy some of their tech, much to our better-halves laments) so it's often hard to say goodbye to things that we've used for countless hours and, in some small way, formed a bond with. So, if you've ever discovered a nifty way to re-use your old gear, please give us a shout at **apcmag@futurenet.com** and share the details – that way, all of us can benefit!

DAN GARDINER
EDITOR
dan.gardiner@
futurenet.com

apc

Future Publishing Australia,
PO Box 1077, Mount Street, North Sydney, NSW 2059
Tel: 02 9955 2677 Fax: 02 9955 2688
SUBSCRIPTION ENQUIRIES: Please call Magshop 13 61 16
Email: apcmag@futurenet.com
Web: www.apcmag.com

EDITORIAL
Editor **Dan Gardiner**
Managing Editor **Melanie Pike**
Features/Disc Editor **Peter Dockrill**

ART/PRODUCTION
Art Director **Troy Coleman**
Senior Designer **Nykke Coleman**

CONTRIBUTORS
Helen Bradley, Simon Chester, Marco Fioretti, Craig Grannell, Tim Hardwick, Phil Iwaniuk, Dave James, Jeremy Laird, Chris Lloyd, Neil Mohr, Matthew JC. Powell, Bennett Ring, Mayank Sharma, Nathan Taylor, Chris Thursten, James Trevaskis, Luis Villazon, Darren Yates

SENIOR MANAGEMENT
Chief Operating Officer **Neville Daniels**

COMMERCIAL
Commercial Director Dave Cox
dave.cox@futurenet.com
Sales Director Paul Marttila
paul.marttila@futurenet.com
Sales Executive Thomas Klingler
thomas.klingler@futurenet.com

ABOUT THE MAGAZINE
APC is published by Future Publishing Australia.

Distributed in Australia and NZ by Network Services.

Printed by Webstar
All contents copyright Future Publishing (Overseas) Ltd, trading as Future Publishing Australia copyright 2013. All rights reserved. While all care is take to ensure information is correct, please check prices and specifications before purchase.

PRIVACY STATEMENT
This issue of APC published by Future Publishing Australia may contain offers, competitions or surveys which require you to provide information about yourself if you choose to enter them or take part in them (Reader Offer). If you provide information about yourself to Future Publishing Australia, Future Publishing Australia will use this information to provide you with products or services you have requested, and may supply your information to contractors to enable Future Publishing Australia to do this. Future Publishing Australia will also use your information to inform you of other Future Publishing Australia publications, products, services and events. Future Publishing Australia may also give your information to organisations that are providing special prizes or offers and are clearly associated with the Reader Offer. Unless you tell us not to, Future Publishing Australia may give your information to other organisations that may use it to inform you of other products, services or events to give to other organisations that may use it for this purpose. If you would like to gain access to the information Future Publishing Australia holds about you please contact Future Publishing Australia's Privacy Officer.

Future

ABOUT FUTURE
Future Publishing Australia is part of Future plc. Future produces carefully targeted special-interest magazines, websites, and events for people who share a passion. We aim to satisfy that passion by creating titles offering value for money, reliable information, smart buying advice, and which are a pleasure to read or visit. Today we publish more than 180 magazines, websites and events, with over 100 international editions of our magazines published under license in 30 countries around the world. Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR)

Peter Allen Chairman of the Board
Zillah Byng-Maddick Chief Executive Officer

FIPP

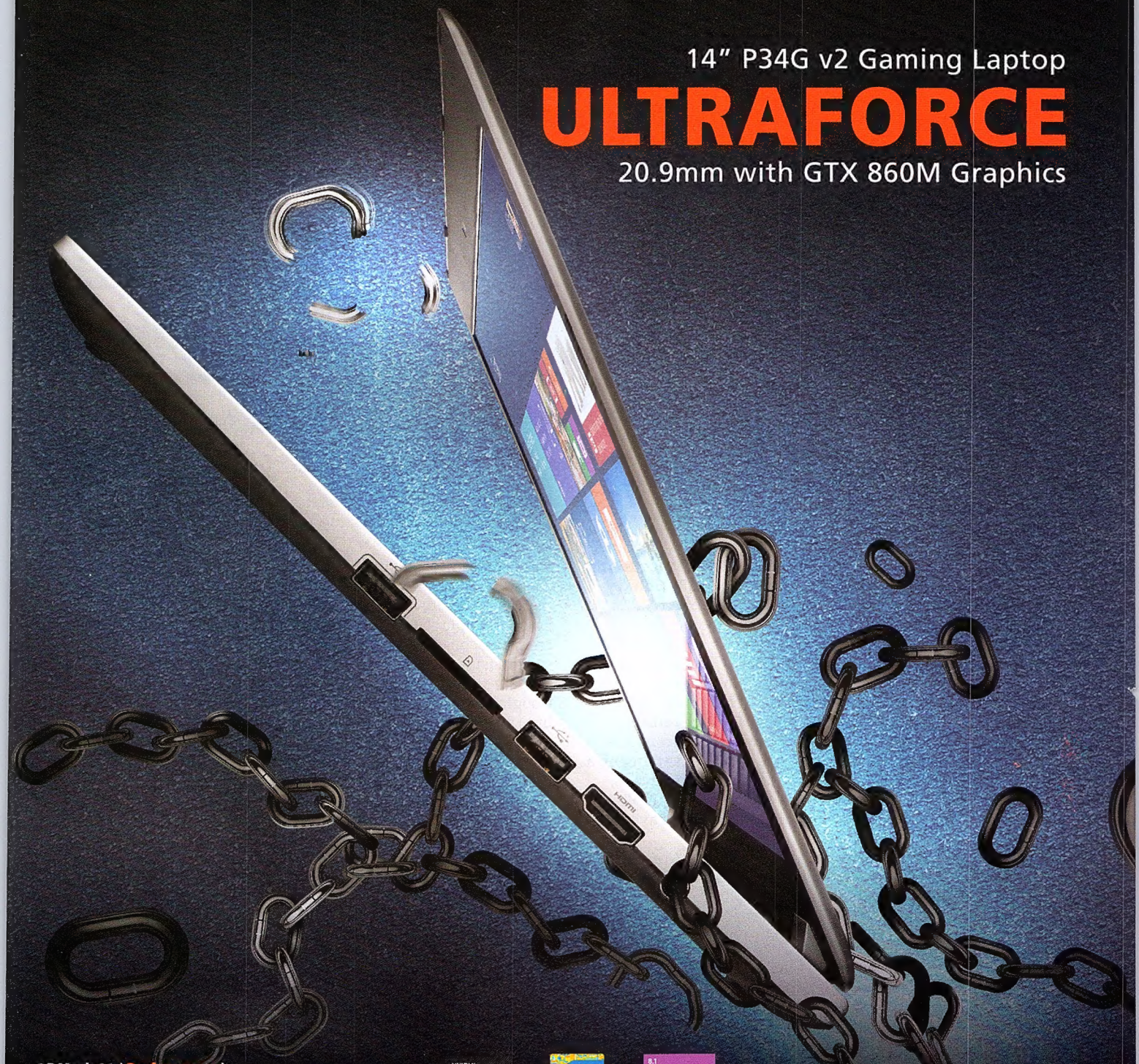
GIGABYTE™

GIGABYTE recommends Windows.

14" P34G v2 Gaming Laptop

ULTRAFORCE

20.9mm with GTX 860M Graphics



3DMark 11 (Performance)

GTX 860M GDDR5 4GB

4th Generation Intel® Core™ i7 Processor

Windows 8.1

Storage up to 256 GB mSATA SSD + 1TB HDD*

FHD Display 170° Viewing Angle

Li-polymer: 11.1V, 47.73Wh; 14.8V, 63.64Wh**

Where to Buy

Available through MSY
http://www.msy.com.au/

MSY Technology Pty Ltd

2 Year Global Warranty

- Warranty covers only laptops.
- Covers pick-up and drop-off service anywhere in Australia

2 Year Global Warranty

*Different configurations available. Please contact your nearest retailer for options. **Models with a 63.64Wh battery do not support 2.5" drive 1TB HDD

MADE in TAIWAN

The entire materials provided herein are for reference only. GIGABYTE reserves the right to modify or revise the content at anytime without prior notice.

Couchside computing

Will the new generation of TV set-top boxes finally make good the promise of the HTPC? Peter Dockrill wonders.

Not quite a decade ago, we were told that our living rooms would be reimagined by a revolutionary new technology: 'the home-theatre PC'. HTPCs were dedicated, entertainment-focused computers designed to sit alongside our large-screen TVs, complemented by software like Windows Media Center and '10-foot user interfaces' promising to take our sedentary lifestyles to the next level. While many *APC* readers will still run such setups, the HTPC revolution never truly took off in the mainstream. The reasons are many, but it's likely the complexity and cost of setting up a full PC in your loungeroom turned off most consumers, especially in the face of numerous cheaper and simpler contemporary alternatives: consoles, PVRs, Blu-ray players, smart TVs and so on.

And then there was the Apple TV. While Apple's rather constrained set-top box has hardly replicated the culture-transforming impact of some of the company's most successful products, it nonetheless has become the de facto template for the industry's second take on the HTPC concept. This time around, rather than offering users a full PC tailored to entertainment purposes, the new generation of TV-enhancing set-top boxes are more like stripped-down appliances, offering a tightly controlled suite of apps and streaming playback channels more akin to a mobile device than an open desktop platform.

Alongside the Apple TV – the subject of persistent upgrade rumours, expected later this year – there's the Roku and Google Chromecast (neither launched in Australia just yet), but two newcomers unveiled recently show competition in this space is only going to heat up. While it's US-only for now, Amazon's new Fire TV (pictured) is the most ambitious of the breed yet specs-wise, with a quad-core CPU and 2GB of RAM ensuring the US$99 box enjoys plenty enough heft for media playback and gaming – it runs specially ported Android games, with an optional Xbox-style controller also available. Even more significant than the Fire TV, however, may be the just-leaked revelation that Google – fresh from its failure with the ambitious Google TV – will soon re-enter the field with 'Android TV', a renewed attempt to conquer the living room with a simpler, entertainment-focused platform backed by multiple hardware vendors.

The era of the eco-font

Whether you're hell-bent on saving the world from environmental degradation or you're just looking to eke out a few more pages from those damnably exxy printer ink cartridges, you'll want to know about Ryman Eco. Billed by its makers as "the world's most beautiful sustainable font", Ryman Eco (freely downloadable from **www.rymaneco.co.uk**) is a new typeface that's said to use 33% less ink and toner than standard fonts. Viewed up close, the distinctive font family makes use of patterned lines and swirls among its stylishly framed characters to generate its ink-saving effect. It's not the first eco-font to attempt this, but it might just be the most typographically-pleasing. And remember, folks: think before you print!

Ryman Eco

Wi-Fi in the sky

Loons vs drones.

Google's CEO Larry Page describes the company's more ambitious goals as 'moonshots': far-reaching projects that come across like science-fiction, but which, if they can be realised, could lead to huge, world-changing benefits. 'Project Loon', Google's experiment to deliver internet access to remote and rural areas via a fleet of high-altitude hot air balloons, is a good example of the moonshot mojo: it sounds crazy, but it just might work. The project, which recently notched up its 500,000th kilometre of in-flight testing (the balloons are in constant motion, travelling on air currents), is now facing competition from another quarter: the Mark-Zuckerberg-backed **Internet.org**, whose singular mission is delivering internet access to poor countries. According to a recent **Internet.org** paper written by Zuckerberg, drone aircraft would provide a superior alternative to balloons or satellites for broadcasting the web from above: "With the efficiency and endurance of high altitude drones, it's even possible that aircraft could remain aloft for months or years. This means drones have more endurance than balloons, while also being able to have their location precisely controlled. And unlike satellites, drones won't burn up in the atmosphere when their mission is complete. Instead, they can be easily returned to Earth for maintenance and redeployment."

Microsoft's dashboard under the dash

We've already seen CarPlay - Apple's endeavour to bring support for the iPhone into 'select' vehicles this year - and now it seems Microsoft will be playing in the same space, with the company demoing a prototype of a Metro-style Windows system that mirrors a user's mobile device content and which could be operated safely by a driver. According to concept screenshots showed off at Microsoft's Build 2014 conference, an in-car Windows OS could enable the driver to access music playback, messaging functions, calling features (including contacts and search for contacting local businesses), map and navigation functions and enable access for some apps. No hard details on when such a system would be available, but with Apple's CarPlay going on-road this year, we don't expect Microsoft (or Google) to be far behind.

Mi Casa, Mu Mimo (if only)

Speaking of patchy internet access, you don't have to go as far as a rural or remote area to wish your Wi-Fi connection would deliver a stronger, consistent signal. Sharing Wi-Fi networks with a lot of other users — particularly on public networks in places like hotels, shops, restaurants and airports — can often lead to signal problems, as everybody's devices scramble to jump onto a limited number of simultaneous connections. Chip-maker Qualcomm might be poised to fix the problem, however, with its recently announced MU-MIMO (multi-user multiple-input and multiple-output) standard set to offer up to three times the connective capacity on 802.11ac Wi-Fi networks. Unfortunately, for the MU-MIMO transmission to operate, both ends of the connection need to support the tech, meaning only newer smartphones and mobile devices will be able to take advantage of the greater connectivity. Still, don't you just love finding reasons to upgrade your gear?

$20 BILLION

Number of Instagrams in the wild. (Clearly not an endangered species then.)

Truly we live in an age saturated by digital media, a fact neatly evidenced by photo-sharing network Instagram's recent announcement — on hitting 200 million users — that said users have uploaded a mind-boggling 20 billion photographs to the service. Quite a figure, and all in less than three and a half years. Future food historians will certainly have their work cut out for them (when they're not too busy taking selfies, that is), sifting through zettabyte after zettabyte of what people ate for breakfast.

FIVE MILLION

Popular Android app carrying Bitcoin-mining malware downloaded up to five million times.

Careful when downloading free mobile apps, folks: security researchers have found a new strain of software that contains hidden digital-currency mining functionality, which uses your smartphone's processor to 'mine' Bitcoin and other crypto-currency variants for others' profit while you're unawares! While mobile apps downloaded from official app stores are generally safer than side-loaded apps from elsewhere, in this instance two apps containing the malware were available from Google Play — with one of the offenders, 'Songs', being extremely popular, with between 1-5 million tracked downloads. The apps have since been withdrawn from Google's app store.

02

How many people does it take to create a traffic jam? You'd be surprised.

Crowd-sourcing data has all sorts of far-reaching benefits, but a recent hack of navigation app Waze highlights that crowd-sourced systems are subject to their own particular drawbacks too: what if the 'crowd' is fake? Two Israeli technology students tested this theory recently, hacking GPS navigation app Waze by contriving a crowd of fake Waze vehicles and creating a virtual traffic jam that looked like the real thing to other Waze users on the road. Egged on by their teacher, the students' proof-of-concept cyber attack diverted the flow of real drivers for hours on end.

22%

Amount of the 'Million Dollar homepage' that has succumbed to link rot.

In the early days of the modern web, **www.milliondollarhomepage.com** was a unique money-making idea: student Alex Tew acquired the fancy-sounding URL and sold pixels on the page for US$1 a pop, with noughties web companies vying for grids to showcase mini banner ads on this glitzy gimmick of a site. Eight years later the page is still live, but a recent investigation by Quartz reveals that 22% of the links no longer work — a stark reminder that neither the web nor the world ever stand still for long.

TEN YEARS

Expected lifetime of Samsung's new Smart Bulb.

To spin the old joke on its head, how many *years* does it take to change a light bulb? Try a decade. Samsung's new Smart Bulb is expected to last 15,000 hours, which means users who buy into the whole 'connected home' utopian dream won't have to pull out the step ladder for some 10 years at a time. Best of all, the lights are controlled via Bluetooth, so all you'll need is an app on your smartphone to wirelessly control up to 64 Smart Bulbs in your home.

Have a need for speed?

Looking for a wireless router that delivers super-fast speed?

How does wireless speeds as fast as 1.3 gigabits per second sound? Well, hold onto your seats because Billion's new BiPAC 8800AXL wireless AC broadband router offers just that! Based on a Broadcom chipset, the BiPAC 8800AXL supports ADSL2+ and is fibre-ready, using an Ethernet Wide Area Network port to hook into the NBN as soon as it comes to your house. It also has four additional Gigabit Ethernet ports plus two USB 2.0 ports, allowing for 3G/4G modem connectivity, print serving or Network-Attached Storage.

Aside from being blazingly fast and NBN-ready, this amazing device is jam-packed with loads of other features, including:

- 4-port gigabit switch
- 1-port gigabit Ethernet WAN (EWAN)
- 2 USB ports for print server, NAS, DLNA and 3G/4G LTE USB modem
- ultimate wireless speed 300+1300Mbps
- SNR adjustments to achieve highest sync speeds
- monitoring of individual LAN/WAN traffic
- QoS for traffic prioritisation and bandwidth management

Speeds up to 1.3 gigabits per second

3 x faster than the current Wireless N protocol

BILCOM5-14

For further information on the Billion BiPAC 8800AXL or for a full list of Billion stockists Australia-wide, visit billion.com.au.

Billion Electric Co., Ltd. (Telex: #3027), since 1973, is one of the leading providers of network equipment in the Asia Pacific region.
For more information, please visit billion.com.au. Billion is exclusively distributed by PC Range Pty Ltd. pcrange.com.au

BILLION®

technotes

» GADGETS

AMAZON FIRE TV

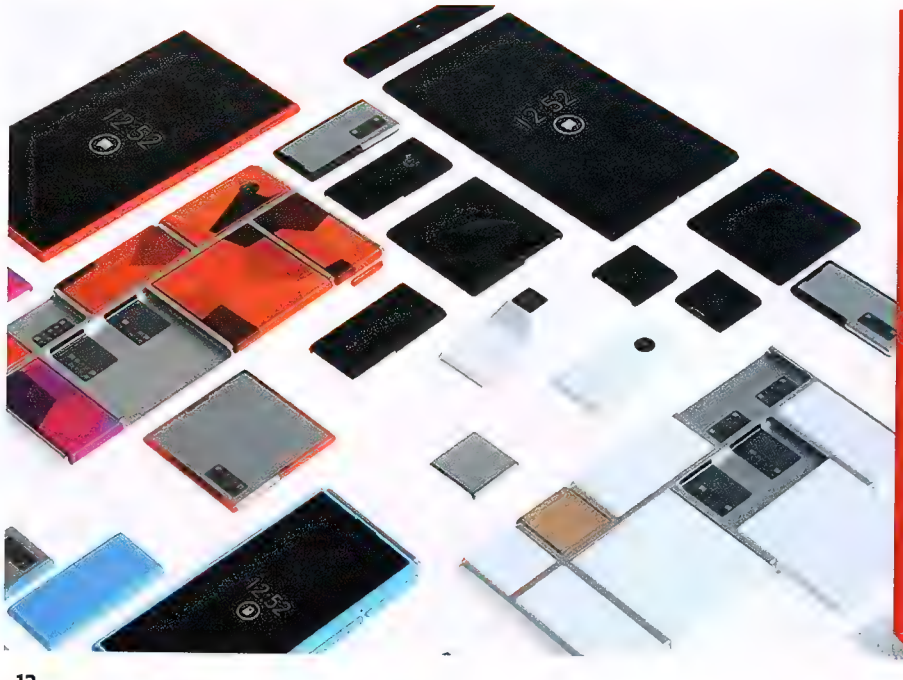
US$99 | WWW.AMAZON.COM

The battle for the lounge room just gained another surprise contender – this time with Amazon jumping into the ring to go up against the Apple TV and its ilk, and perhaps even the Xbox and PlayStation. While Amazon says its new Android-powered streaming media player (which hooks into the company's own Instant Video movie and TV service, plus other US outfits like Netflix and Hulu) isn't a gaming console, it's launched in the US with a range of 100 games and an optional dedicated games controller. (Or alternatively, the ability to use almost any third-party Bluetooth one.) As with other Fire products, this isn't a 'real' Android product – Google's OS is used as a backbone but Amazon's done a significant amount of work to customise it and fit it into its own ecosystem. The question, as always, is whether we'll ever see it officially released in Australia. And perhaps more importantly, if we do, will it have access to even half the streaming services the US enjoys?

BATTERYBOX

US$139 (PRE-ORDER) | WWW.GETBATTERYBOX.COM

There's already an armada of after-market battery accessories out there that exist to supply your mobile and portable devices with extra juice, but BatteryBox is different. While it looks and functions much like any number of Lithium-ion extenders, under the hood it runs a controller called 'BatteryOS' that helps regulate the charge management of the device, which its maker, Gbatteries, says effectively negates battery degradation compared to the limited charge cycle of traditional Li-ion batteries. When BatteryOS is running, batteries can retain up to 96% capacity after 3,000 full discharge cycles (over five years). Impressive numbers to be sure, but let's wait for the final release.



GOOGLE PROJECT ARA

TBA | WWW.PROJECTARA.COM

Google first announced its tentative plans to develop an open, modular smartphone platform – which is currently dubbed Project Ara – back in 2013, but more recently its announced that a series of three developer events will take place throughout 2014 (the first happened last month). The idea behind Ara is to allow the creation of smartphones that can be customised to a particular users needs. Don't want to waste money on a 20MP camera, but need the fastest graphics chip available? No problem! If this all sounds like a pipe dream, it's increasingly sounding like it will result in real products – Google's even released a Module Developers Kit for prospective devs to get started. Check it out at the link above.

RAZER ADARO WIRELESS HEADPHONES

$199 | WWW.RAZERZONE.COM

We're edging ever-closer to the ideal where a single pair of headphones is suitable for all your on-the-go-audio needs. Connecting via Blutooth 4.0 to your like-enabled devices, the lightweight, and surprisingly stylish looking Adaro from Razer boast custom-tuned 40mm drivers housed within plush leatherette on-ear cans. Sonically they do favour the bass a touch, but not to the detriment of the mids and highs. The Adaro proved itself to be a great travel companion – this reviewer commutes four hours a day – and switched between our iPhone and laptop without skipping a beat or suffering from the startup lag some Bluetooth devices do. The 20 hour battery life is the icing on the cake. It needs to be stressed that these are Bluetooth *only*, and yes, we wish it had a 3.5mm jack as backup.

BREFFO GUMSTICK STAND

US$19.99 | WWW.BREFFO.COM

Most of us don't need some sort of fancy, super-expensive stand for our smartphones – and that goes doubly now that the Gumstick stand from Breffo promises to elegantly get the job done. This minimalist, flexible stand can be bent to hold a smartphone at any angle, in either portrait or landscape view – and it should be just as effective even after you've upgraded to next year's smartphone model.

WARNOG KLINGON ALE

TBA | WWW.FEDERATIONOFBEER.COM

Last issue we brought you news of a miraculous high-tech wine-maker for the home (which turned out not to exist, incidentally), and this month another beverage-related oddity has come into our orbit, and though real this time – *we think* – it certainly seems no less far-fetched. Warnog, taking its name from the fictional Klingon ale, is an officially licensed Star Trek beer from Canadian brewers (wait for it) 'Federation of Beer'. On sale soon in the US and Canada, Warnog follows the FoB's success with another Trek-themed beverage, Vulcan Ale, marketed as: "A logical choice for a palate-pleasing libation." We're not making this stuff up! Honest. ■

tech notes

EPINIONS

Who says you can't add upgrades to an all-in-one PC?

"A bit of a play around on Tinkercad, a couple of failed print runs and tada!... hard drives-r-us!"

HARD DRIVES-R-US

I've just finished reading your 400th issue. Congratulations on a great magazine and weathering the years. I started reading *APC* back in about 1983 and it brings a nostalgic tear to my eye thinking about the technology of the time. No touchscreens, Wi-Fi or USB – yet we thought it was all so 'cutting edge'. I fondly remember my Tandy TRS-80 and spending hours typing BASIC and chasing typos that I'd introduced into the code. My dad bought me an Apple IIc, and I added a Z80 processor so I could do my CP/M homework – those were the days!

Now we have all-in-one PCs which aren't nearly as friendly when it comes to upgrades – which got me thinking of a use for my Printrbot 3D printer. So far it's been mainly used for printing fancy key rings or dollhouse furniture for my niece. So recently when I wanted an extra hard drive in my PC I had a new project to try.

Most screens (and all-in-one PCs) have a VESA mount on the back, which unless you have it hung on the wall, generally goes unused. So I cracked open the case, made a new power cable and plugged it into a spare SATA port, then bought the cables out through the rear. A bit of a play around on Tinkercad, a couple of failed print runs and tada!... hard drives-r-us! If any of your readers have the same upgrade inclination, I've uploaded the design to Thingiverse (**www.thingiverse.com/thing:184843**) for everyone to try.

Craig Bailey

CHEAP AS CHIPS

Your 400th issue has finally prodded me into sending this.

When I was working at a television station in Perth as a tech, I got a bit annoyed that as techs we absolutely needed to be full throttle on PCs, but it was all at our own expense and in our own time. The company did virtually nothing for us.

As you know, you can't learn all you need in a few hours a day at work, especially as it was seen as "playing on the computer instead of working".

So around 1993 I made a list to show the general manager what it was costing me. On top of this outlay from my own pocket, I was also devouring four of five computer magazines a month, *APC* included, and buying many of those huge computer books that I thought would make me an expert – Visual Basic became very important in my work at this time, so many books were required.

IT COST HOW MUCH IN 1993!?

HARDWARE	
KEYBOARD	$125
CASE AND POWER SUPPLY	$125
MOTHERBOARD (486 CPU INCLUDED)	$980
MEMORY (2MB)	$150
5.25IN FLOPPY DISK DRIVE	$99
3.5IN FLOPPY DISK DRIVE	$85
HARD DISK (~40MB)	$400
VGA CARD	$265
IDE CARD	$45
MOUSE	$120
286 MATHS CO-PROCESSOR (REQUIRED TO RUN AUTOCAD)	$265
MONITOR (COLOUR NEC XV15)	$1,170
MONITOR (B&W MICROBEE 12IN AMBER PHOSPHOR)	$275
286 (CPU)	$250
TOTAL, HARDWARE	$4,354

SOFTWARE	
MS DOS (V5.0)	$95
WINDOWS (V3.1)	$265
LOTUS AMI PRO WORD PROCESSOR	$265
XTREE (FILE MANAGER)	$155
MICROSOFT ACCESS DATABASE	$149
TOTAL, SOFTWARE	$929

In about 1996 I persuaded the general manager that I was worth a $4,000 "computer allowance" each year, to buy what I needed. I successfully argued that no other employees in the company had to go to TAFE and get an Advanced Diploma in Electronics, get the Broadcast and Television Operator's Certificates, pay for all this gear at their own cost, learn all this stuff in their own time, and work a 40 hour week. As you can tell, I got a bit grumpy! (My efforts to get this allowance for my colleagues were, sadly, totally resisted.)

But compare these costs to the price of equipment now. What a contrast! I bought all the bits to make a new Core i7, 8GB RAM, 256GB SSD etc last week – it cost about $1,100 all up. We certainly have it good these days. No complaints now!

Peter Croft ■

APCMAG@FUTURENET.COM

Come on, have your say!

We want to hear what you think. Add to these discussions or email your views (in fewer than 250 words) to **apcmag@futurenet.com**. All correspondence becomes the property of APC and is subject to editing. Letters must include full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

BETTER, MORE TECHNICAL

Jaycar offers a wide and extensive range of electronic products.
Visit our website or one of our stores and find out yourself!

Find Your Nearest Jaycar Store Here
Scan this QR code with your phone

3 Port Ethernet Adaptor

$129

Extend your home/office network over the mains power line. Simply plug the adaptor into a mains outlet then connect to your router. Features 3 x 10/100Mbps RJ-45 ports.

- Energy saving mode if no data is transmitted
- Works up to 300m
- Data transfer rate up to 500Mbps

YN-8354

NEW

Note: Always plug the adaptor into a single socket. Do not plug into power board or UPS.

Power Line Ethernet Adaptor

Share Internet throughout your home using your power line. Plug this PLC adaptor into your AC power socket and connect it to your modem by a Cat5 cable.

- Data transfer rates: Up to 500Mbps
- Works up to 300m
- Power supply: 100 - 240VAC, 50/60Hz

YN-8352

$99

2014 CATALOGUE OUT NOW!

FREE! when you spend $30 or more on our website.
*Free catalogue, make sure you ask for it on the comment field when you check out. Valid until 05/06/14

Jaycar Electronics
Better, More Technical

USB 2.0 Dual Band Wireless Network Adaptor

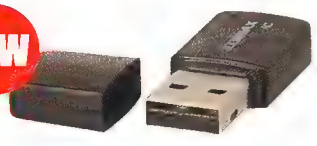
Features dual-band connectivity for maximum compatibility and performance in your network environment for internet use, HD streaming and gaming.

- WPS (Wi-Fi Protected Setup)
- Connect to 2.4GHz at max 150 Mbps or 5GHz at max 433Mpbs
- 802.11ac 600

YN-8328

$39.95

NEW



Wi-Fi Multi Card & USB Reader

This clever device creates a secure Wi-Fi hotspot so you can share and transfer files from various memory cards and USB storage devices wirelessly between your computers, tablets, and smartphones.

- Up to 20m range
- Built in rechargeable battery
- Can be used as a 3G router

YN-8426

NEW

$59.95

Wireless N150 ADSL2+ Modem Router

A high performance router that provides full ADSL2+ capability and superb reliability as a cost-effective networking solution for the home.

- 4 X 10/100 Mbps RJ-45 ports
- USB sockets for easy file sharing

YN-8340

$59.95

NEW

Universal Dual Band Wi-Fi Extender

Dual-band functionality built in to connect to both the older 2.4GHz routers and the new 5GHz routers, proving a more stable Wi-Fi signal.

- WEP, WPA-PSK, WPA2-PSK encryption
- 802.11n
- Data rate: 300mbps
- Mains powered
- User access control
- WPS (Wi-Fi Protected Setup)

YN-8364

NEW

$89.95

Wireless Broadband Routers – 802.11n

These intelligent routers can operate as a Wi-Fi range extender, a Wi-Fi access point or a wired/wireless router. Supports the 802.11b/g/n standards and provides excellent wireless coverage.

- 1 x RJ-45 Fast Ethernet WAN port
- 4 x RJ-45 Fast Ethernet LAN ports
- WPS (Wi-Fi Protected Setup)
- WEP, WPA & WPA2 encryption

Two models available:
150Mbps
YN-8325 $39.95
300Mbps
YN-8327 $59.95 (shown)

NEW

FROM $39.95

USB 3.0 Male A to Micro B Lead

Connects your computer to the latest micro-USB 3.0 peripherals, such as external HDD's, printers and scanners.

- 1.8m

WC-7774

$14.95

NEW

Universal Wi-Fi Extender

Eliminate Wi-Fi dead zones and extend existing 802.11b/g/n networks.

- Mains powered
- Wi-Fi strength LED indicator
- 1 X 10/100 Mbps ethernet LAN port
- RJ-45 network lead
- Range extender & Wi-Fi bridge

YN-8360

$69.95

Ethernet Switches

Enhance network performance and efficiency. Mains powered or via USB port. Supports auto-negotiation and cable length detection. Includes power supply and USB power adaptor.

- 5VDC
- 8 x RJ-45 ports
- Compact size 137(L) x 76(W) x 25(H)mm

8 Port 10/100Mbps N-Way Switch
YN-8077 $24.95

8 Port 10/100/1000Mbps N-Way Gigabit Switch
YN-8078 $59.95

NEW

FROM $24.95

Prices valid to 05/06/14

FREE CALL ORDER **1800 022 888**

www.jaycar.com.au

Privacy.com

While you can't put a price on privacy, you can still figure out how much it costs, reports Peter Dockrill.

It's impossible to calculate the extent to which the modern web has impinged upon and eroded the traditional notion of 'privacy', but our inability to measure the losses of this immaterial commodity only exist if we insist on viewing the issue holistically. As one of the commentators of *The New York Times* discovered, if you break down the analysis to just one dimension – financial outlay, for example – you can indeed put a price on privacy.

In a bid to protect her privacy from the traps employed by the murky triumvirate of data miners (legal), data hackers (illegal) and data brokers (probably both), reporter Julia Angwin invested in some serious utilities to keep herself to herself. She subscribed to a service that encrypted her cloud data, one that bypassed untrusted connections and one that provided her with disposable email addresses and phone numbers, plus signed up for a product that, for a fee, would opt you out of data broker databases – although the provider she chose seemed to process less than half its obligations before ultimately being suspended. Not all of Angwin's purchases were high-tech; she also bought a monitor blurrer "to shield my laptop screen from cafe voyeurs."

So, the million dollar question remains: just how much does privacy cost? According to Angwin, US$2,200 was the final sum she spent in one year to keep her data to herself – although most of this bill reflects recurring annual subscription fees, meaning the total cost over a lifetime could be truly vast, and leading her to conclude: "In our data-saturated economy, privacy is becoming a luxury good. After all, as the saying goes, if you aren't paying for the product, you are the product. And currently, we aren't paying for very much of our technology... Not long ago, we would have bought services as important to us as mail and news. Now, however, we get all those services for free – and we pay with our personal data, which is spliced and diced and bought and sold."

A DROP IN THE OCEAN

One of the constant user bugbears in the mobile world is fragmentation: apps are designed to only do one thing (ie. run), but different phone models with different operating systems on different mobile networks make it very difficult for developers to get their programs running with any kind of consistency. But just how bad is the problem? App performance firm Crittercism released its mobile benchmark study recently, answering that exact question. Internationally, with a recorded 2,582 devices running 106 OS versions across 691 carrier networks, it seems there are over *100 million possible permutations* of potential user experience for any particular app. But not all OSs are equal, either; Crittercism found iOS 7.1 offered the most stable user experience, while Android 2.3 Gingerbread had the highest incidence of crashes. The most crash-prone apps are games, followed by other graphics-intensive apps such as media, photo and video programs. ■

ENDUSER

Share your stories!

If you have an interesting story about technology users, their experiences and the issues that affect us all (whether funny or serious), email us at **apcmag@futurenet.com**. All correspondence becomes the property of APC and is subject to editing. Letters must include writer's full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

SUBSCRIBE TO *APC* NOW AND GET 6 ISSUES FOR ONLY $40

12 ISSUES FOR ONLY $69

WHY SUBSCRIBE?

- Take advantage of our new subscription offer of 6 issues for $40 if you choose to auto-renew*
- Or get 12 issues of your favourite tech mag for only $69!
- Save even more, with 24 issues for $128. That's only $5.30 per issue!
- Free delivery of every issue straight to your door
- Free disc with exclusive software in every issue

SAVE UP TO $110

BUILD AN AMD PC: A88X BOARDS ON TEST
apc
May 2014
Issue 402
YOUR EXPERT
FREE DISC INSIDE
MAINTAIN AND OPTIMISE YOUR PC
A SIMPLE LIFTA$K WITH HOKEY-$
A SIMPLE ALARM CLOCK FOR YOUR PC
+ VIDEO-EDITING ESSENTIALS & MORE!
PROJECTS
» CREATE A KILLER MEDIA PC
» BUILD A CENTRAL HUB FOR YOUR MUSIC
» RE-USE OLD ANDROIDS AS SECURITY CAMS
» RETRO GAMING MACHINE
OLD GEAR: NEW TRICKS
DON'T LET YOUR OLD TECH GO TO WASTE! REPURPOSE YOUR UNUSED SMARTPHONE OR PC WITH OUR HOW-TO GUIDES
KEEP WINDOWS XP FOREVER
Microsoft's support may have ended but that doesn't mean you have to ditch it
INDISPENSIBLE HOW-TOS
» Browse securely on your Android phone
» DIY Nvidia Project Shield
» Chromecast alternatives
HOW TO
HOST YOUR OWN CLOUD
Get your files anywhere, securely
NVIDIA'S NEW LAPTOP GPUs
Can gaming bliss finally come to ultrabooks?
Future

FREE DELIVERY TO YOUR HOME OR OFFICE EACH MONTH

HURRY

OFFER ENDS MAY 28, 2014!

TWO EASY WAYS TO SUBSCRIBE TO *APC* MAGAZINE

VISIT www.magshop.com.au/future

OR

CALL 13 61 16 and quote M1405APC

TERMS & CONDITIONS This offer expires May 28, 2014, and is available to subscribers within Australia only. Please allow 6-8 weeks for delivery of your first issue. For full terms and conditions, see www.magshop.com.au/future. Please see our privacy policy on page 3. *6 issues for $40, then $40 charged to your credit or debit card every 6 issues thereafter on auto-renewal.

apc HOT PRODUCT

LABS BENCHMARK RESULTS

Gaming performance

BIOSHOCK INFINITE	FPS - HIGHER IS BETTER
GIGABYTE P34G (2014)	76.39
GIGABYTE P34G (2013)	52.48

0 30 60 90 120 150

GRID 2	FPS - HIGHER IS BETTER
GIGABYTE P34G (2014)	115.39
GIGABYTE P34G (2013)	87.73

0 30 60 90 120 150

METRO: LAST LIGHT	FPS - HIGHER IS BETTER
GIGABYTE P34G (2014)	58.67
GIGABYTE P34G (2013)	36.67

0 30 60 90 120 150

TOMB RAIDER	FPS - HIGHER IS BETTER
GIGABYTE P34G (2014)	92.7
GIGABYTE P34G (2013)	61.3

0 30 60 90 120 150

ALL GAMES TESTED AT 1080P WITH MEDIUM/NORMAL DETAIL SETTINGS.

LAPTOP
$TBA | WWW.GIGABYTE.COM.AU

GIGABYTE P34G (2014)

A new GPU makes a surprising difference in this laptop refresh.

The oft-mismatched timings of major PC component releases – such as CPUs vs GPU – can sometimes result in PC and laptop upgrades that only get you halfway there. On paper, that's the case with the two slim gaming laptops from Gigabyte and MSI we've looked at this month. If the names sound familiar, it's because we've tested these laptops before. In both cases, the lack of a name change does these laptops a disservice, the changes are more than just half measures.

We reviewed the 2013 model of the P34G not too long ago (see *APC* February, page 21) and, as before, it remains a compact gaming laptop with some top-drawer parts, all built around a decent-quality (if a tad reddish-tinged) 14-inch display at 1080p. As with the MSI GS70, look at the spec sheet and it'll appear that not a lot has actually changed – there's largely the same internals (a quad-core Core i7-4700MQ processor with 16GB RAM and a 256GB Lite-On SSD all running Windows 8.1). What it adds to the mix is an upgraded Nvidia graphics chip based on its all-new Maxwell architecture – and that has significantly more impact that we've seen previously.

Usually, going from one GPU generation to the next, you can expect a modest performance increase – 20-30% at a stretch. The jump up from last year's GeForce GTX 760M to the GTX 860M is, then, quite a bit bigger than we're used to; it comes close to reaching a 50% increase in some real-world gaming tests. Even the demanding *Metro: Last Light* hovered around 60fps at 1080p with Medium details.

The one downside here is that fan noise is still a bit of an issue – when the P34G's GPU spins up, it's definitely noticeable. Not perhaps to old-school '4kg desktop-replacement' gaming laptop standards – which sound much like hairdryers – but to a louder degree than the comparatively-discrete systems inside Razer's Blades or MSI's GS70 (opposite).

That new Maxwell GPU seems to be more power frugal than its Kepler forbear too, as it's resolved the mediocre battery life we saw in the original P34G. Here, it's jumped nearly a full hour in both PC Mark's Home and Work battery tests – from 1:55hr/2:47hr to 3:01hr/3:42hr, respectively.

The graphics chip isn't the only upgrade either – Gigabyte has also added 802.11ac Wi-Fi with dual-band support via a classy Intel 7620 network card.

A 30-40% increase in battery life delivered alongside a 30-50% bump in gaming frame rates is a pretty phenomenal leap from a single laptop generation – and not even a 'full' generation at that, with the bulk of this laptop remaining the same as its forebear. While Maxwell's first appearance on desktop (via the GeForce GTX 750) has perhaps been a little disappointing, these new mobile parts are the real deal. And elsewhere, this remains a friendly and pleasant to use little laptop – the build quality still doesn't match the all-alumiumin chassis you see from the likes of Razer and Apple, but then you'll pay much more for the latter.

Pricing was still to be confirmed on this refreshed P34G at the time we went to print, but if it can come close to matching the $1,699 price of the 2013 model, this portable little gaming machine packs a hell of a punch when it comes to value. ■ **Dan Gardiner**

Verdict

Features	★★★★★
Performance	★★★★½
Value	★★★★½

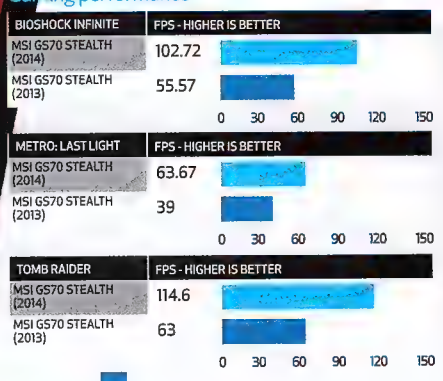
A solid little laptop that hides a motherload of gaming grunt underneath its nonchalant chassis.

★★★★½

apc RECOMMENDS

LABS | BENCHMARK RESULTS

Gaming performance



ALL GAMES TESTED AT 1080P WITH MEDIUM/ NORMAL DETAIL SETTINGS.

GAMING LAPTOP

$2,899 | WWW.MSI.COM

MSI GS70 Stealth (2014)

MSI shows that you can (almost) have it all.

This 2014 refresh of MSI's behemoth 17-inch ultra-thin gaming notebook follows much the same formula as the upgraded Gigabyte P34G – the major new addition is a GPU based on Nvidia's new Maxwell design. In the battle against last year's model, this isn't quite as fair a fight as between the two Gigabytes – MSI provided us with the top-end $2,899 model of the Stealth, which uses a GeForce GTX 870M. The 2013-edition GS70 only packed a GTX 765M, so the 870M is a significant step up. Though it's also a step up in price, with the former costing $600 less, at a far more reasonable $2,299. (In fairness, there's also a new $2,499 unit available that runs the same GTX 860 chip that's in the Gigabyte, opposite.)

So what does that extra $600 get you? Essentially, up to twice the gaming performance. As you can see in the benchmarks charts above, the GTX 870M stomps all over the 765M – a GPU that really was quite competitive and popular among notebook makers when it launched mid last year. It can run practically any recent-release game at a solid 60fps on Medium details and outdoes the 860M by between 10-20% in most games. Compared to the P34G, the Stealth's cooling fan does stay reasonably quiet and low-pitched in use – you'll still hear it clearly when you fire up most games (non-demanding 2D titles notwithstanding) but it's less noticeable than the Gigabyte.

Alongside that uber graphics chip are a range of other gamer-centric features, like Killer DoubleShot Ethernet that does automatic prioritisation of gaming network traffic (although in testing we've found you'll get higher pings if you, you know, pause those torrents while you jump into a *Titanfall* session) and a brightly-backlit SteelSeries keyboard with slightly larger gaming keys (i.e. WASD) to make them easier and more comfortable to use. Thankfully, that rainbow-coloured keyboard can also be customised and toned down to only use a single colour – and even a low-key white or blue hue for those of us who don't want to look so leet.

There's also only a single Windows-key on the keyboard, which is positioned over to the right-hand side to prevent accidental presses (and subsequently finding yourself in the Start menu) mid game. That's great in theory, but if you're a keyboard-shortcut junkie that move might be a turn off – this reviewer's own reliance on Windows key-based shortcuts did make the non-standard placement a little frustrating at times.

Battery life, however, is still the GS70's real achilles heel. That big screen, slim chassis and blazing performance all come at a price, and it's longevity – although to be fair, it's not so dire that it ruins the entire deal. The GS70 lasted 2:17hr in our lighter Work benchmark, so you can still venture out and about – albeit for brief periods – should the need arise. (Last year's edition fared even a little worse, at 2:07hr in the same test.)

How's that all stack up? It's a bit of a mix really. If you've got $3,000 to spend on a gaming laptop this one does have a lot to offer, but you won't lose too much by stepping down to the lower-priced $2,499 model. The P34G does in some ways offer a more well-rounded package, though there's no denying that the GS70 is still a gaming beast in a very attractive package.

Dan Gardiner

Verdict

Features	★★★★½
Performance	★★★★
Value	★★★★

Offering great performance in a thin package, the only significant shortcoming is mediocre battery life.

★★★★☆

GRAPHICS CARD

$199 | WWW.MSI.COM

MSI GTX 750 TI GAMING 2GB

Nvidia's new top end tech debuts in budget-town.

It's not the fastest, the cheapest or the craziest of graphics cards based on Nvidia hardware, so what make's MSI's new GeForce GTX 750 Ti so special? The answer is Maxwell, the new blueprint Nvidia will be using over the next two years to make all of its new products.

Until the GTX 750 Ti, Nvidia used a design known as Kepler to build the GPU that powers each graphics card. Maxwell replaces Kepler with a design that is twice as power efficient, which makes sense considering most PC growth is in the realm of power-sensitive mobile computing, the area Maxwell will be used most. Nvidia usually wheels out its new designs at the high end of the market in $900 products, which makes the 750 Ti an interesting proposition, as it costs a mere $200. At this price it's going head to head with graphics cards based on AMD's R7 265 product – so which is best?

We tested both cards across three of the more popular PC games available – *Battlefield 3*, *Hitman Absolution* and *Metro Last Light*. As both cards are targeting the affordable PC gamer, we used medium settings at 1,920 x 1,080 resolution. AMD's R7 265 took a sizeable lead in *Battlefield 3* by around 25%, and the GTX 750 Ti simply couldn't catch up. *Hitman Absolution* showed a 14% lead to AMD, while *Metro* nailed it home with another 10% victory.

If power saving is your first goal, the GTX 750 Ti should save your power bill. However, if all you care about is gaming, the R7 265 offers superior performance at a lower price.

■ Bennett Ring

Verdict

Impresses with low power consumption, but AMD's got this one beat on price and performance.

★★★☆☆

GRAPHICS CARD

$179 | WWW.SAPPHIRETECH.COM

SAPPHIRE DUAL-X RADEON R7 265

It's a case of the old versus the new — guess who wins?

It's amazing how closely synchronised AMD and Nvidia's product releases are. Within a week of the R7 265's release, Nvidia had an answer in the form of the GTX 750 Ti. Sapphire is AMD's bestest buddy, so it was no surprise to see the first R7 265 cards to hit Australia wearing the Sapphire logo. Let's see what this new entry-level gaming GPU can do, especially compared to its Nvidia rival.

The AMD R7 265 GPU at the heart of this product is actually one of AMD's older products, but with a shiny new name. This is really a Radeon HD 7850 in disguise, a year-old product that was known for excellent performance at the price of higher power usage. The new version has received a slight performance bump thanks to a faster GPU frequency, which is probably why Sapphire has whacked twin fans on this product. This potent cooler keeps the card nice and cool without being too loud, though it's definitely louder than the GTX 750 Ti.

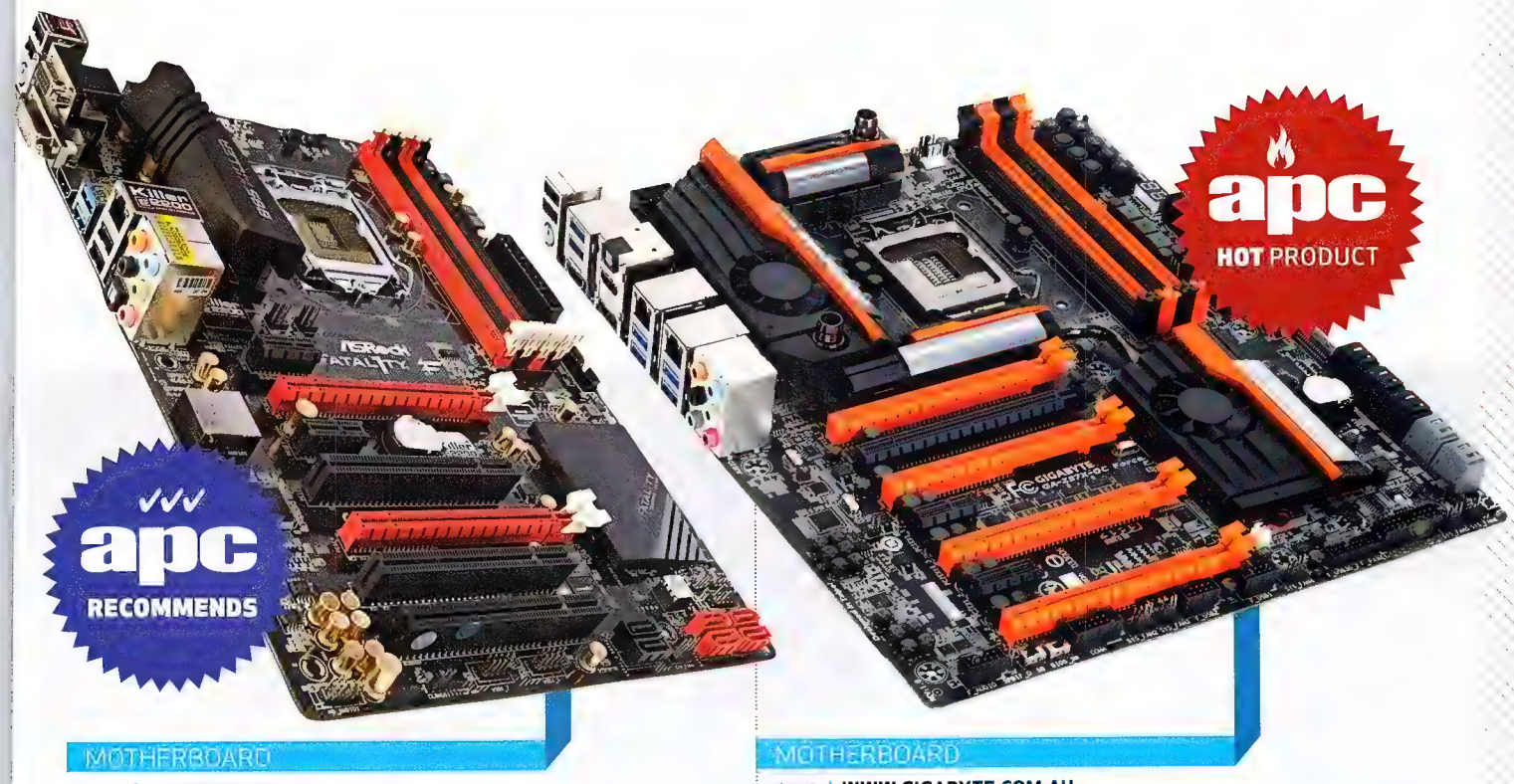
AMD has equipped this card with 2GB of onboard memory, identical to the GTX 750 Ti, though it's not quite as fast as NVIDIA's memory. However, the GPU more than makes up for this difference; as the benchmarks in the GTX 750 Ti review (left) indicate, the R7 265 thoroughly trounces Nvidia's new budget beast.

Despite being based on older technology, there's simply no competition between the GTX 750 Ti and the R7 265 – the latter wins every time when it comes to gaming performance, and you'll save yourself twenty bucks in the process. Double win. ■ Bennett Ring

Verdict

A card that's both cheaper and faster than Nvidia's equivalent. A great choice for budget gaming.

★★★★☆



MOTHERBOARD

$125 | WWW.ASROCK.COM

ASROCK FATAL1TY B85 KILLER

A business chipset that means business in the budget sector.

This gaming-focused motherboard from ASRock is a bit of an odd duck, using the cheaper, business-oriented B85 chipset rather than the traditional Z87. The B85, like the H87, is a more cut-down option to allow manufacturers to make enterprise boards without the price premium of the Z87. Traditionally, there's been restrictions on overclocking these budget chipsets to drive enthusiasts to the more expensive Z's, but with Haswell, manufacturers have shunned those.

The Fatal1ty B85 board is, as such, capable of overclocking K-series chips just like a Z87. Where you're still restricted is in the top memory speed, only allowing for DDR3 up to 1,600MHz. Considering how little extra performance faster RAM generally offers, that's a bit of a non-issue.

And moreover, the B85 Killer still looks every bit the gaming board, with PCIe 3.0, multi-GPU CrossFire support and Killer Ethernet to automatically prioritise gaming network traffic. It is missing out on a few USB 3.0 ports compared with the Z87 and H87; it's limited to a maximum of just four ports – two on the back plus a header on the board itself.

In terms of stock performance, the B85 Killer is genuinely impressive, even in comparison to the top Z87 boards we've tested, and it even managed to get to 4.7GHz with our i7-4770K when overclocked. It ran pretty hot at that speed, but was otherwise stable.

In short, while some features are missing, for most people this one'll pack more than enough to build a great value gaming machine on a budget.

Dave James

Verdict

An impressive B85 board, with some serious overclocking performance.

★★★★½

MOTHERBOARD

$250 | WWW.GIGABYTE.COM.AU

GIGABYTE GA-Z87X-OC

The Gigabyte OC motherboard makes an impressive return.

Gigabyte's OC range of boards first saw the light of day in the X58A-OC – a minimalistic board that featured a simplified IO shield and comparatively limited features. After a fairly long hiatus the OC is finally back, but unlike its X58 forebear, the new Z87X-OC is feature packed.

Gigabyte's trademark burnt-orange colour scheme is in full effect. And those good looks are backed up with a plethora of features. Four PCI-e slots capable of supporting four-way Crossfire sit beside six SATA 6Gbps and 10 USB 3.0 ports. Power switches, a debug LED, overclocking ratio and base clock switches and voltage measure points are all mounted on-board, too, not to mention a 16-phase digital PWM capable of delivering clean power without ever breaking a sweat.

Performance is a focus for the OC, which in our testing equalled the leading competitor in 2D performance and exceeded the competition in multi-card 3D performance. Single card frame rates were within 1% of the top Z87 boards in both synthetic and gaming benchmarks. Gigabyte has been working hard to improve memory overclocking here and it's payed off, with strong results displayed over a number of different memory kits tested.

It's hard to find problems with the OC, however the inclusion of only six SATA ports may prove unpopular when other boards in this price range have eight or more. Gigabyte has priced the OC to run off the shelves; $250 is an extremely affordable price for a board with this kind of feature set and performance.

James Trevaskis @teamau

Verdict

An affordable, high performance board. Recommended for everyone from entry level to overclockers.

★★★★½

"Acer's even bucked the Android trend of using a 16:9 aspect-ratio screen, instead going for the same 16:10 design you'll see on Apple's iPads."

ANDROID TABLET

$250 | WWW.ACER.COM.AU

ACER ICONIA A1-830

An Android tablet that looks to Apple for design pointers.

If you've ever dreamed of owning an Android tablet that was a little more like the iPad mini, Acer's heard your cries and produced the Iconia A1-830. At a glance, it's almost a dead-ringer for Apple's smaller tablet, sporting a very mini-like physical design, right down to the 7.9-inch display, thin brushed-aluminium chassis (with very iPad-like curved corners and edges) and the placement of the power and volume buttons.

Acer's even bucked the Android trend of using a 16:9 aspect-ratio screen, instead going for the same 16:10 design you'll see on Apple's iPads. That's a decision we can actually happily get behind. While 16:9 is common on TVs and bigger desktop monitors, at smaller tablet screen sizes (where images and text need to be scaled differently for correct readability) we'd argue that 16:10 is a better fit.

It's not so much an issue with gaming or watching movies, but mixed media tasks, like web-surfing, are arguably more comfortable with a 16:10 display. That's particularly the case in portrait orientation, but either way, on a 16:9 tablet screen everything feels just a bit horizontally or vertically squished when you're surfing the web.

Inside, the Iconia's running on Intel Atom hardware – specifically an older 2012-model Z2560 at 1.6GHz (which has since been outclassed by newer Z3000-series Atoms chips). But despite being a generation behind, the Z2560 is actually significantly faster than what you'll find in the iPad mini. In general system benchmarks, the A1-830 can be up to twice as fast as its Apple counterpart, and it's more than up to scratch to power 3D tablet games and give fast web page loading and scrolling. There's 16GB of onboard storage plus a microSD slot for adding up to 32GB more media storage. (As with all Android devices, microSD storage isn't intended for installing apps.)

For $250 – or $80 less than the iPad mini – that'd seem to be a pretty solid package. That said, there are some caveats to be aware of. The single biggest shortcoming with the A1-830 is its 1,024 x 768-pixel display. While it's good enough to get by, as on the standard iPad mini (which packs the same resolution), that lowish pixel count does make text rendering a little blocky and also harder to read at smaller font sizes.

Compared to the Nexus 7's 1,920 x 1080-pixel screen and it's really no contest – the Nexus wins hands down when it comes to text clarity and definition.

Things are also a little wobbly when it comes to battery life. The A1-830 isn't bad, per se, but its result of 6:44hr in our video-streaming test was a full hour less than the current Google Nexus 7 and – moreover – almost three-and-a-half hours behind the iPad mini's 10:04hr.

Considering the price, those drawbacks aren't total deal killers and if you can live with them you'll find this is a great little budget tablet. We can't help but wish, however, that Acer offered a higher-res model – even if that meant paying a premium to get it.

Dan Gardiner

Verdict

Features	★★★½
Performance	★★★
Value	★★★★

As close as you'll get to an Android version of the iPad mini, this is a solid budget tablet.

★★★½

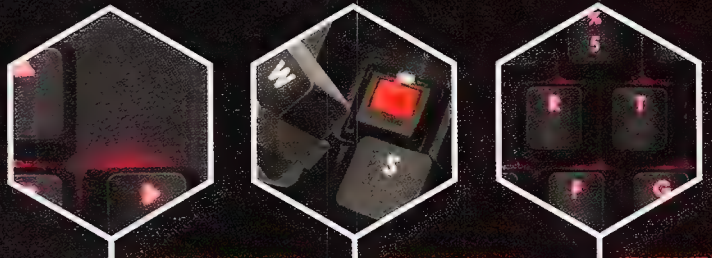
CORSAIR®
corsair.com

"Keyboard of the Year."
PC POWER PLAY, MARCH 2014, ISSUE#225

CORSAIR VENGEANCE
K70

Assert. Surpass. Defeat.
When you're playing to win you need tools, not toys. Pro gamers around the world are making the K70 their weapon of choice because of its unprecedented combination of performance, comfort, durability, and style. If you've gotten yours, you know. And if you haven't, you've probably been beaten by someone who has.

Learn lots more at: corsair.com/K70



DURABLE ANODIZED BRUSHED ALUMINUM CHASSIS

AVAILABLE WITH CHERRY MX RED, BROWN, OR BLUE KEYSWITCHES

KEY-BY-KEY CUSTOMIZABLE BACKLIGHTING

Corsair Vengeance K70 is built with original Cherry MX keyswitches, the #1 choice of gamers. Made in Germany with unequaled precision using real gold cross-point contacts, Cherry MX keyswitches have proven performance and consistency with over 5 billion in use around the world.

CHERRY MX RED
Ultra-fast, ultra-smooth linear response

CHERRY MX BROWN
Silent, with light tactile feedback

CHERRY MX BLUE
Tactile feedback with an audible click

facebook.com/Corsair @CorsairMemory youtube.com/CorsairMemoryInc

CHERRY

Logo is a trademark of Future US, Inc. and is used with permission © 2014 Future US, Inc. All rights reserved. Quote reprinted with permission

"If ioSafe can't recover the data itself, it'll pay up to $2,500 per disk to have a third-party attempt to recover it."

apc RECOMMENDS

NAS

$870 | WWW.IOSAFE.COM.AU

ioSafe 214

As hard as nails, but way better at storing data.

The NAS competition has never been so fierce. The drop in drive price and increase in demand for secure storage means NAS devices are hot stuff.

The ioSafe 214 is the latest iteration of the twin-bay NAS model from ioSafe, which not only offers data redundancy via mirrored drives, but fire and water protection too. This isn't just anecdotal protection, but is backed up by the ASTM E199 certification for lasting 30 minutes at 843°C, plus the ability to protect data for up to 72 hours submerged in 10 feet of salt water.

While we didn't try setting our ioSafe on fire or take it swimming, we have seen it baked on a BBQ and dropped into water with the drives remaining functional.

Physical protection hasn't been overlooked. The NAS comes with a Kensington lock and an optional padlocked floor fixture that secures the entire NAS. Without the optional floor fixture there's no lock on the drive bay, so someone can still unbolt the cover and physically remove the drives, but then you've encrypted your data, right?

The downside to this type of all-round physical protection is it's a beast of a unit. Almost as large as a smaller four-bay NAS or mini-server and it weighs-in at 12.7kg, which is about the same as six MacBook Pros. If that's entirely relevant? Lastly but not least, is that ioSafe is so sure of its product that it throws in a paid-for data recovery service. If ioSafe can't recover the data itself, it'll pay up to $2,500 per disk to have a third-party attempt to recover it.

As the spec states, it's a twin-bay NAS and supports RAID 0, 1, 0/1 and JBOD. Access to the bays is via the bolted-on front panel, beyond that is another bolted-on panel and inside that are two more bolts securing the drives' slide-in caddies, to which the drives are actually secured.

Setting up the ioSafe 214 is easy peasy thanks to the licenced Synology DSM. This is the Synology browser-based interface that is as functional as it is pretty, which is to say extremely on both counts. It provides a Linux-like desktop environment and a GUI access to all the various settings and server-side controls you would want.

It's hard to know where to start with the support offered by the Synology DSM. Everything from support for 2,048 users, iSCSI, external USB 3.0 storage running ext3/4, FAT32 or NTSC, plus a host of services including the obligatory cloud access is here. A single camera licence is thrown in for the surveillance module and it supports the usual DLNA/UPnP media server, iTunes, FTP, VPN and LDAP support. It's comprehensive, simple to use, highly impressive and expandable via the Synology app store.

In terms of speed, the ioSafe 214 is fast enough, though not scorching, but we'd put this performance more down to the 1TB drives included with this test model than the NAS itself. A write speed of 108MB/s is good, single access reads peaked at 62MB/s, while asynchronous reads touch 80MB/s. Considering the price, the single Ethernet port was a little disappointing, especially considering the disaster-proof type pitch this model hangs itself upon. We'd also poke at the limited number of USB ports, if you're adding printers and a wireless dongle then you're going to be left struggling for expansion options but it's a very minor quibble. ■

Neil Mohr

Verdict

Features	★★★★½
Performance	★★★★
Value	★★★½

Expensive, but you're buying this for the disaster-proof features, which it has in abundance.

★★★★☆

$375 | WWW.FRITZBOX.COM.AU

FRITZ!BOX 7490

More features than you've had hot downloads...

What do you want from a DSL router? A bare bones box that gets the job done, or a connectivity tour de force? Those who fancy the former had better look elsewhere. Over $300 is one hell of a price to pay for a router.

Then again, German outfit AVM has thrown everything but the kitchen sink into the FRITZ!Box 7490, its latest flagship model. In fact, there may actually be some kitchenware in that almost endless spec list – it's so extensive we can't be sure we've spotted everything.

Let's start with the DSL gubbins. It's fully VDSL compliant, so it supports super-fast 'fibre' connections. Then there's ac dual-band Wi-Fi in full 1,300Mbps spec, ensuring the fastest possible wireless network speeds, quad-gigabit Ethernet, a pair of USB 3.0 ports, a DECT-based wireless phone hub with support for six phones and five digital answering machines, as well as media server and FRITZ!NAS functionality – the latter with DLNA compliance for easy syncing with multiple devices.

Got all that? Good. But what's it like to use? We're very familiar with Fritz!Boxes, which makes the appearance of the same old web interface a mixed blessing.

On one hand, it means we know exactly what we're dealing with. For newbies to the Fritz!Box, however, it's all looking a little late '90s. That doesn't actually matter, but what does detract from the experience is the slightly clumsy setup procedure.

There's an initial wizard for setting up your internet connection, but it doesn't go beyond the basics. For detailed settings, you'll be digging into confusing sub-menus. Then again, for advanced users who don't want hand-holding, there's no doubting the power or configurability. We just think the layout and menus could be easier to navigate.

WI-FIZZLE

So, what about its overall performance? In the past, we've been a little frustrated by the time taken for high-end Fritz!Box models to go from a cold boot to a full internet connection, and this model doesn't improve things hugely, reducing that time by just 10 seconds compared with an older 7370 model. Not that three minutes and 40 seconds is particularly bad, but at well over $300, it would be nice if it booted noticeably quicker than your average commodity spec DSL router.

For DSL performance, there's better news. We didn't have a fibre connection handy, but using a standard ADSL 2+ connection rated at 16Mbps, firing up **Speedtest.net** resulted in a consistent advantage of nearly 1Mb for the download link versus the 7370. Nice.

Network latency is good, too, dropping from 30ms on our test connection into the teens. That bodes well for gamers looking for the best possible performance for their online shooters.

The improved ping was achieved over wireless, so basic wireless implementation is promising.

The problem is that you'll probably be paying for a lot of functionality that you're never going to use, and that makes it a dubious value proposition despite the impressive performance.

Jeremy Laird

Verdict

Features	★★★★★
Performance	★★★★½
Value	★★★½

A fast router, with a hell of a feature set, but it's pricey and you're probably paying for redundant functionality.

★★★★½

GAMING HEADSET

$75 | WWW.ASUS.COM

ASUS CERBERUS GAMING HEADSET

Unassumingly packed with features and bass. Especially bass.

You'd be excused for thinking the Cerberus headset was from the SteelSeries stable, given its striking similarities to the latter's Siberia range.

The Siberia V2's scaffold-struts with self-adjusting, slung headband still sits at the top of my most-comfortable headset list. I'm seriously surprised the design isn't copied more often. Well, ASUS has done just that and its gotten things *almost* right. Sadly the tensioning in the headband isn't quite there and instead of hugging the dome, it tends to create weird, uncomfortable pressure after a short while. Similarly, the rest of the headset's body material choice – cheaper plastic and polyurethane-coated leather – fall a little short, especially considering you can pick up the Siberias for around the same price.

It's not all bad however, as the Cerberus packs a punch with its utility and features. The adjustable snake arm boom is great – and removable when not in use – plus there's another mic in the in-line control unit, which is compatible with smartphones, the PS4 and presumably the Xbox One when used in conjunction with Microsoft's Controller Adapter.

Sonically, the Cerberus boasts "thundering bass" as a feature, and delivers in bucketloads. The 60mm drivers hammer home the bottom end, creating a soundstage so dense that anything mid to high has trouble penetrating. It's not so bad for explosive gaming or Fear Factory, but it does murder any ambient subtleties in the source. Don't trade in the Siberias just yet. ■ Troy Coleman

Verdict

Some great features outweighed with poor design choices and overly bass-heavy drivers.

★★½☆☆

GAMING MOUSE

$90 | LEAPFROGLOBAL.COM/AMG

ARMAGGEDDON ALIEN IV G9X

Can a relatively unknown brand compete against gaming giants?

Armaggeddon is a newcomer to the Australia market and we've previously looked at one of its mechanical keyboards (see *APC* January, page 30); a decent offering, but one that failed to stand out. That's not a worry for the Alien IV G9X mouse. With a flat and wide shape, it's distinctive among the sea of narrowish, claw-grip friendly designs.

That wide shape means it isn't a great fit for twitchy FPS gamers who like to use their fingertips to hold the mouse – this design has MMO and RTS players in mind. That's further reinforced by macros being available via the driver software and a third main mouse-button clicked with your ring finger. For comfort, you need to place your fingers in the left- and right-button's grooves and rest your upper palm on the mouse for support. The low back means the traditional 'palm' grip isn't as effective – there's not enough height or arch to support it. In use, it's reasonably comfortable, with a fairly smooth and frictionless matte-black rubber coating. You can further adjust weight via five included 4.5g inserts. On the downside, it isn't quite as flexible when it comes to customisability: the counts per inch (CPI) sensitivity steps, for example, are fixed at set intervals – 400, 800, 1,600, 3,200, 4,800 and 6,400. And the driver software is relatively basic; macro creation is easy, but doesn't offer much editing flexibility (delays between strokes can only be a maximum of 6.25 seconds, for example). What also dampens the appeal is the premium asking price. ■ Dan Gardiner

Verdict

An unusual gaming mouse with some appealing features, but a high price and underfeatured drivers.

★★★☆☆

WHY DO THE CIA AND FBI USE

ORIGIN

WE CAN'T TELL YOU, THAT INFORMATION IS

BUT WE CAN TELL YOU WHY NASA, THE AUSTRALIAN ARMY AND SWINBURNE UNIVERSITY OF TECHNOLOGY CHOOSE ORIGIN. IT'S SIMPLE. WE MAKE THE HIGHEST PERFORMING DESKTOP AND LAPTOP COMPUTERS IN THE WORLD.

ORIGIN | WWW.ORIGINPC.COM.AU | 1300 904 021

PCWorld 4.5 out of 5 Stars | PC WORLD Best BUY | PC GAMER EDITOR'S CHOICE ★★★★★ | SEAL OF attack OF THE SHOW | KICK ASS! | EDITORS' CHOICE MAR 12 cnet | gameinformer

GAMING KEYBOARD

$149 | WWW.CMSTORM.COM.AU

CM STORM MECH

A top-end board with a highish price that proves a mixed-mech bag.

Wow. We think it's fair to say Cooler Master's peripherals division, CM Storm, has gone out on something of a limb with the visual design of its new flagship keyboard.

Resembling a keytar that the white Power Ranger might use, the Mech certainly distinguishes itself from the crowd with an aluminium top plate, those diagonal lines and that handle. You're either going to be completely sold on the bold look, or completely reviled.

Regardless of its looks, the Mech performs very well. It boasts a full mechanical switch layout, available in Cherry MX Red, Blue or Brown to suit even the pickiest typists.

You'd be hard pushed to find a gaming board that didn't offer mechanical switches today, however, so to assess a board's quality, you need to look elsewhere. Feature wise it's furnished with the fairly standard Windows key on/off toggle and adjustable lighting settings, but on top of that it also has five macro keys, each activating a bay that can hold 15 macros, plus two USB 3.0 passthrough ports and audio/line in jacks. They're all very welcome additions but ultimately ones that arguably don't matter all that much. Well, not as much as build quality does, and compared to the aluminium chassis of certain Corsair boards, the Mech comes up a bit short. We're not convinced this CM Storm board has one strong feature you can point at and say: 'that's worth paying more for.'

■ Phil Iwaniuk

Verdict

All the bells, whistles and switches you'd expect, but the extra cost goes on thin air.

★★★½☆

GAMING KEYBOARD

$229 | RAZERZONE.COM

RAZER BLACKWIDOW ULTIMATE

Smoke and clickers.

We have a test for you prove if you're a 1337 g4mr; can you feel an actual – not imagined – difference between the Cherry Blue mechnical switch we've seen/used in gaming boards for years and Razer's new in-house custom-built Green switch?

On one hand, the Cherry Blue features 2.2mm actuation under 50g of force and that nice clicky sound we all love. While the Razer Green boasts 1.99mm actuation, 50g force ... and the nice clicky sound we all love. *Blink.*

We really do applaud the bravado of the Razer marketing machine; this is yet another smoke and mirrors prestidigitation to allow the peripheral giant to shift yet another component in-house to manage pricing.

Aside from the fresh swiches, the Blackwidow Ultimate is essentially the same board we looked at back in 2010. It's a solid, well-built 1.5kg wedge featuring an extended backlit keyset with 1,000Hz ultrapolling and 10-key rollover, plus a specific mode for gaming. There's a bank of five macro keys down the left flank, multimedia controls along the top and audio jacks and a single USB 2.0 passthrough on the right – USB 3.0 would have been better. Out in the field the Blackwidow Ultimate feels as robust as it looks and its natural wedge design towers above anything else we've looked at even without the risers deployed putting the keys on steeper incline (which does take some getting used to). Also on the steep side – though there's no getting used to it – is the price. ■ Troy Coleman

Verdict

An expensive (though capable) full-sized board fitted with Razer's first-gen of mechcanical switches.

★★★☆☆

apc RECOMMENDS

MONITOR

$599 | WWW.BENQ.COM.AU

BENQ XL2720Z

Dedicated gaming monitors don't come much more feature-packed than this.

Has there ever been a PC monitor more packed with gaming-friendly features than the new BenQ XL2720Z? If so, we'd really like to know what it is, because the spec list on this thing is ridiculous.

From the top, those features include Motion Blur Reduction, Black eQualiser, Low Blue Light, Game Mode – pause for breath – Smart Scaling, FPS and RTS modes, flicker-free tech, pixel overdrive, dynamic contrast, Nvidia 3D Vision support and 144Hz refresh.

Those are just the highlights. Drill down into the specs and the features just keep coming. In our experience, however, there's no substitute for a good LCD panel. If that's not part of the package, no amount of fancy image processing will salvage the situation.

By that metric, the BenQ XL2720Z is perhaps inevitably a mixed bag. It's immediately obvious that you're looking at a TN rather than an IPS or VA panel, that's for sure. That's partly thanks to poor vertical viewing angles. Whenever a single colour spans the whole panel, as with the Windows 8 welcome screens, there's some very obvious colour shift going on, top-to-bottom.

The backlight is a little dull too, which, combined with TN technology's tendency to leak light, makes for slightly dirty looking whites. Then there's the fact that you've got 1,920 x 1,080 pixels stretched across a 27-inch surface. The pixel is consequently pretty coarse.

We don't want to over-emphasise these niggles though – for a TN, the static image quality is good – but you won't mistake it for a premium panel.

As for all those gaming features, well, as a rule of thumb we're not fans of kludges like dynamic contrast and aggressive pixel overdrive. Much better to just have a damn fine panel to begin with.

However, there are exceptions. For instance, we love the slickness and smoothness you get with 144Hz refresh. Once you've gone 120Hz-plus, you won't want to go back. Then there are technologies that split opinion. For some, any stereoscopic 3D tech that uses glasses is a non-starter, but if that kind of thing is your bag, Nvidia 3D Vision is as good as it gets. Ditto anti-flicker tech. Most people aren't bothered by backlight flicker, but if you are, anti-flicker support will obviously be welcome.

What you'll really want to know is which camp the BenQ XL2720Z's new goodies fall into. Motion Blur Reduction is likely to be divisive. It does lessen blur, but it also reduces contrast, making the image look more dull. As for the Low Blue Light feature, it's meant to reduce eyestrain, but we're not convinced. The idea is that you can have bright images without straining your eyes by dialling down the backlight.

All that said, this is a super gaming monitor. The pixel response and chassis design are great, and the OSD is our favourite of any monitor. The mouse-like S-Switch allows you to program three image modes and jump between them in a flash, which makes all that image processing much more usable and accessible.

It's not a great all-rounder of course, but it's not meant to be. It's an out-and-out gaming screen, and in that role it's one of the best.

Jeremy Laird

Technical analysis

Does Nvidia's G-Sync tech make high refresh like the BenQ XL2720Z 's 144Hz capability redundant? That's a very interesting question. G-Sync's ability to match game frame rate with monitor refresh certainly makes for remarkably smooth gaming at refresh levels as low as 40Hz, but we can still tell the difference between 40Hz and 140Hz. You know what we're about to say, don't you? Yup, what we really want is G-Sync combined with high refresh for the absolute ultimate in super smooth gameplay.

Verdict

Features	★★★★½
Performance	★★★★
Value	★★½

A simply excellent dedicated gaming screen. Not the best all-round panel, but that's not what BenQ is aiming for.

★★★★

SMARTPHONE

$800 | WWW.LG.COM/AU

LG G FLEX

Look out Samsung — there's now a serious contender to the Galaxy Note phablets.

Lets just get the elephant in the room out of the way: the curved screen on LG's new 6-inch Android phablet is a gimmick.

While it makes the G Flex stand out, it doesn't really add a whole lot to usability. LG claims that the curved design makes the display more "immersive" and the phone comfortable to hold, and also moves the mic closer to your mouth. We're not quite sold on the curve adding to immersion — that 6-inch display likely has more to do with how great the G Flex is for movies, games and web surfing. There's other good stuff on offer here too. The G Flex houses the same Snapdragon 800 and Adreno 330 CPU/GPU combo that's common in other recent flagships, plus 32GB of onboard storage and a variety of semi-useful multitasking and interface tweaks. The best of these is the 'knock on' ability, where you double-tap the screen to wake the phone. The power and volume buttons are uniquely placed on the back, and once you're used to it, it's quite comfortable to use. The power button also doubles as an LED notification light, letting you easily see when you have new alerts. There are downsides to the G Flex. That 6-inch OLED display is only 720p, but in reality, it doesn't actually make much difference — that's still enough pixels so there's no jagged edges. And like Samsung's OLED displays, this one's got a vibrance and richness that LCD-based screens can't match. We wish the battery was removable and there's no microSD card slot, so you're stuck with the onboard storage. Those aside, it's a solid alternative to Samsung's Galaxy Note 3 — and a striking one too.

Dan Gardiner

Verdict

That curve is a gimmick, sure, but the G Flex is still a great phone for those who like 'em big.

★★★★

SMARTPHONE

$552 (TELSTRA) | WWW.SONY.COM.AU

SONY XPERIA Z1 COMPACT

Has Sony finally nailed the 'mini flagship' smartphone?

Sony's following in the footsteps of rivals Samsung and HTC with the new Xperia Z1 Compact — essentially a mini version of its flagship Xperia Z1.

The Z1 Compact has a significant advantage over its Galaxy S4 mini and HTC One mini counterparts, however, in that it's being released a good 8 months later so it's got significantly newer and faster hardware. Physically, it does a pretty good job of aping the full-sized Z1, using the same hardened-glass front and back with a metal frame around the edges. The Compact is however a little thicker, which makes it feel a bit more like a stockier cousin to the Z1 rather than a direct shrink. In most other respects this smaller model is the most-faithful miniaturisation we've seen — the only significant difference to the Z1 is the change to a 4.3-inch LCD screen at a lower 720p res, compared to 5-inches at 1080p. Apart from that, it keeps all the Z1's best features (a Snapdragon 800 CPU at 2.15GHz, Adreno 330 GPU and 2GB RAM with 16GB internal memory) and blitzed our benchmarks combined. The dust-resistant and waterproof chassis, 20.7MP camera and microSD slot don't hurt either. That 20 megapixel sensor won't guarantee great photos, of course, but in testing shots were exceptionally smooth and sharp — though skin tones were a little yellow. Battery life is impressive — it lasted over 10 hours in our streaming video test, and a respectable 3:33hr in GFXBench's gaming battery benchmark. The Compact is a compelling mix of great performance, features and future-proofing.

Dan Gardiner

Verdict

A surprisingly faithful shrink of its bigger counterpart, offering great value and great performance.

★★★★½

msi

GAMING G SERIES

JUST GAME!

GAMING EVOLUTION

May 11, 2014 HITS THE MARKET!

Killer E2200 GAME NETWORKING

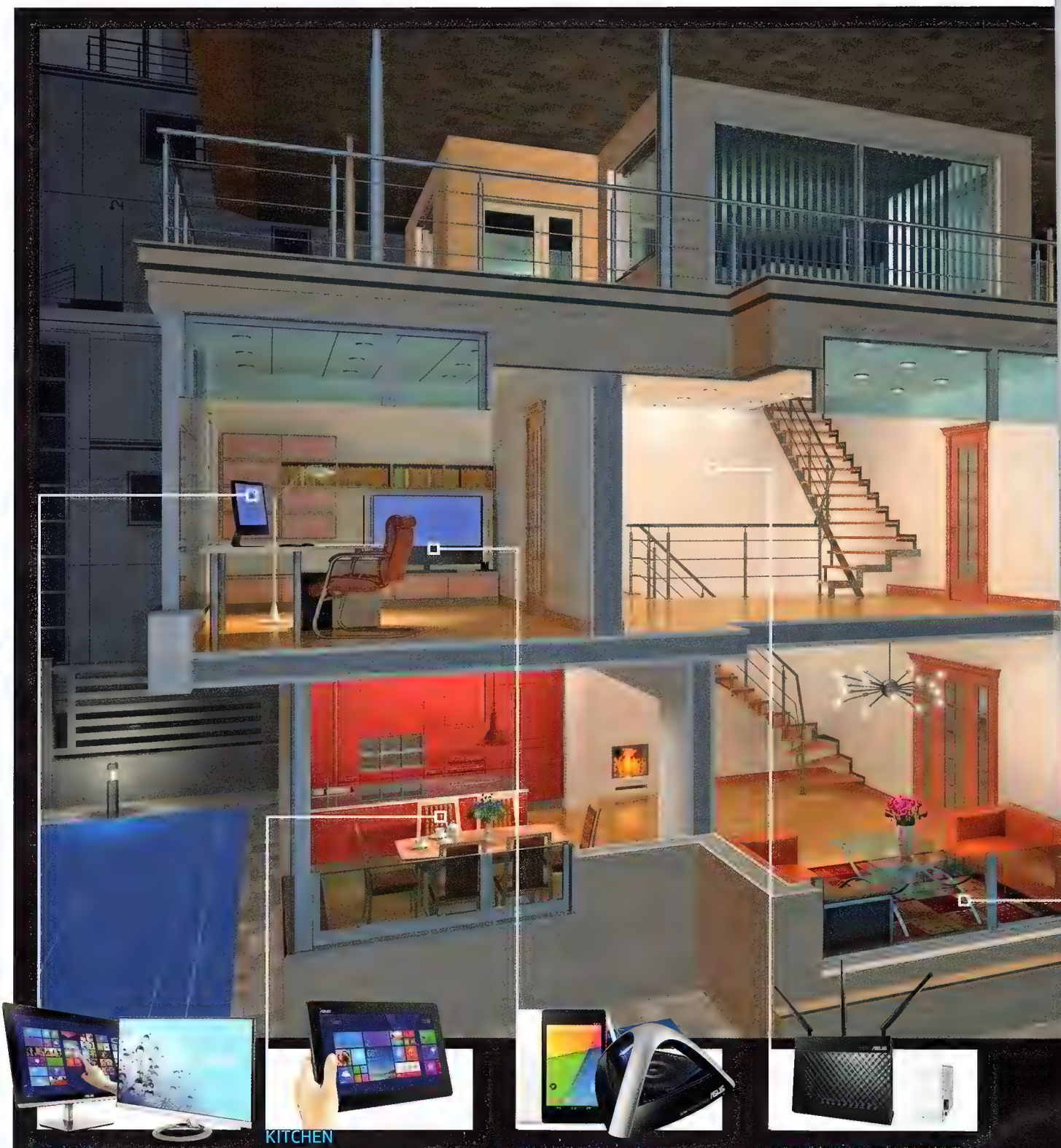
Kill your lag

Audio Boost

Reward your ears with true quality

MSI Australia / game.msi.com

ASUS®

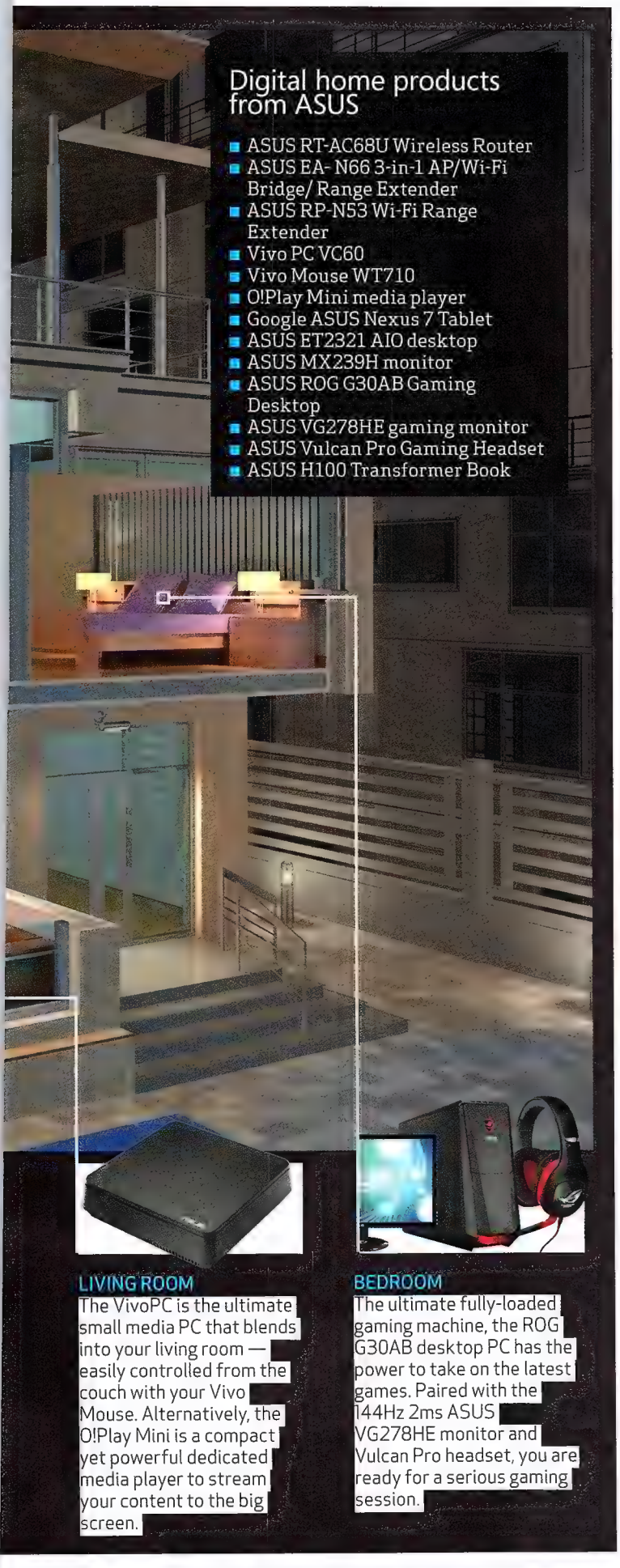


STUDY
An ASUS ET2321 all-in-one desktop is a versatile workhorse that still has a fun side. Connect a second monitor such as the MX239H to increase productivity or plug in your gaming console via the HDMI input for some after-hours fun straight from the all-in-one desktop screen.

KITCHEN
Your ASUS products know no bounds — the H100 convertible notebook makes a great kitchen companion. Just detach the screen and you can use it as a virtual cookbook, accessing recipes from the ASUS Ai Cloud or online.

STREAMING MEDIA
Stream Full-HD content smoothly to your Google ASUS Nexus 7 straight from Ai Cloud thanks to your 802.11ac router. You can also bring high-speed wireless connectivity to your game console or other RJ45 ports with the dual band EA-N66 3-in-1 AP/Wi-Fi Bridge/ Range Extender.

WIRELESS EVERYWHERE
The ASUS RT-AC68U wireless router is the ultimate central hub for your network — you can even plug in an external storage to simply add network accessible storage. An ASUS RP-N53 Wi-Fi range extender will ensure that you get great signal even upstairs.



Digital home products from ASUS

- ASUS RT-AC68U Wireless Router
- ASUS EA- N66 3-in-1 AP/Wi-Fi Bridge/ Range Extender
- ASUS RP-N53 Wi-Fi Range Extender
- Vivo PC VC60
- Vivo Mouse WT710
- O!Play Mini media player
- Google ASUS Nexus 7 Tablet
- ASUS ET2321 AIO desktop
- ASUS MX239H monitor
- ASUS ROG G30AB Gaming Desktop
- ASUS VG278HE gaming monitor
- ASUS Vulcan Pro Gaming Headset
- ASUS H100 Transformer Book

LIVING ROOM
The VivoPC is the ultimate small media PC that blends into your living room — easily controlled from the couch with your Vivo Mouse. Alternatively, the O!Play Mini is a compact yet powerful dedicated media player to stream your content to the big screen.

BEDROOM
The ultimate fully-loaded gaming machine, the ROG G30AB desktop PC has the power to take on the latest games. Paired with the 144Hz 2ms ASUS VG278HE monitor and Vulcan Pro headset, you are ready for a serious gaming session.

For more information on ASUS products for the digital home, scan in the QR code to the left with your smartphone or tablet, or visit **www.asus.com/au**.

ADVERTISING FEATURE

Digitalise your home with ASUS

Linking all your technology to create a smart, connected house has never been easier.

The heart of your digital home should always be a rock solid wireless router — like the RT-AC68U. With dual-band 802.11ac Wi-Fi as well as Gigabit Ethernet, it can handle multiple Full HD streams and can provide speeds up to 1,300Mbps at 5GHz and 600Mbps at 2.4GHz, respectively. It also has USB 3.0, letting you easily add network storage and is a gateway to your online or network ASUS Ai Cloud storage. Backing it up, the dual band RP-N53 wireless range extender brings great signal strength to the dark corners of your house — which is great for when you want to play podcasts through your Nexus 7 tablet while working in the garage.

From there, you know the latest ASUS products are set up for trouble free integration. The lounge room is the perfect place to relax and use your VivoPC on the big screen (the Vivo Mouse makes navigation a breeze), or simply stream content via your O!Play Mini media player. If you want your fun to be a little more interactive, then fire up your ROG G30AB and play through the latest games — your Vulcan Pro headset will keep things immersive without disturbing anyone else. If work is still on the agenda, the ET2321 is a flexible all in one PC that can even handle a second monitor for extra productivity, or share it's display with other HDMI devices.

ASUS even has you covered in the kitchen, where you can take your cooking to the next level with your H100 notebook. Not only can you access recipes stored in your ASUS Ai Cloud, you can surf the net for more culinary ideas. Devices without quality dual-band Wi-Fi facilities such as gaming consoles can be a problem (especially if you rent your house and can't install cabling) but never fear — the EA-N66 3-in-1 AP/ Wi-Fi Bridge/ Range Extender point brings high speed wireless connectivity to anything with a LAN port.

No matter your needs, the ASUS range makes it dead simple to create your own digital home.

software

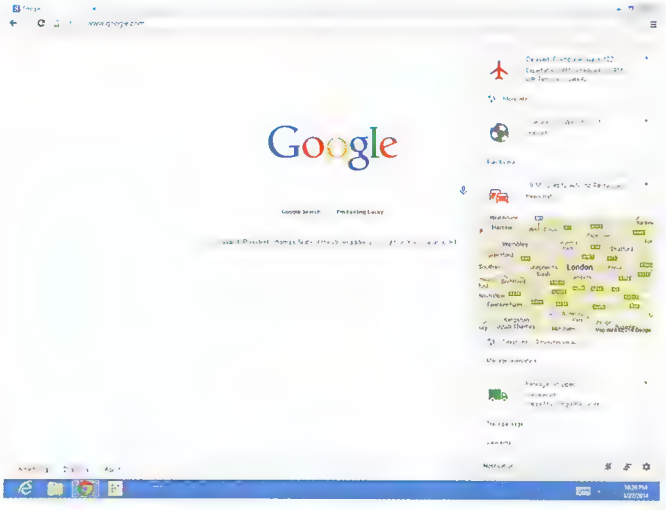
» APPS FOR ALL THE PLATFORMS EDITED BY PETER DOCKRILL

Windows SOFTWARE

Chrome

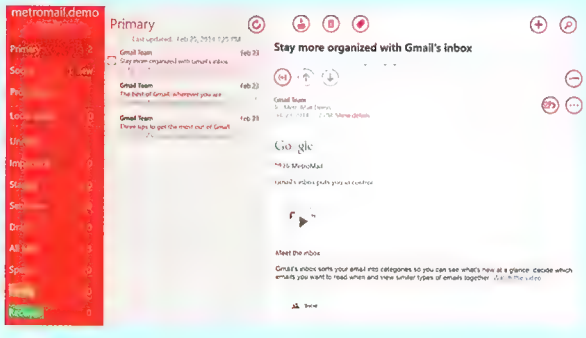
Google Now hits the desktop, but it's a mobile world.

FREE | GOOGLE | WWW.GOOGLE.COM/CHROME



It seems like it was only last issue that we were covering Chrome in these pages — and, as a matter of fact, we were — but Google's ceaseless additions to its desktop browser warrant similarly ceaseless updates. Following quick on the heels of hands-free voice search, Google has now ported its real-time alerts system, Google Now, from the mobile world to the desktop (both Windows and Mac). If you're an Android user, you might well be familiar with Google Now already. It's a contextually aware assistant service that offers you information cards based on your location and habits, ie. local weather, places of interest, nearby transport options and so on.

To activate it within Chrome, sign into the browser using the same Google account that you use for Google Now on mobile. The corollary of this is that, unless you already use Google Now on your Android smartphone or iPhone, it won't be of much use to you. The reason for this is that the service is inherently tied to your location, and in this instance, Google Now calculates that singularly from the location of your mobile device. Still, if you're already a user of both Google Now and Chrome (and a lot of people are), the new level of integration between the pair could make both services that little bit more indispensable.



MetroMail

FREE | APOELIN | TINYURL.COM/QB5P3J3

Gmail, if you can believe it, just turned 10 years old. 10! We remember feeling proud as punch nano-eons ago when we first scored an invite to the then-semi-exclusive email service. On the occasion of the anniversary, some of Gmail's early developers have shared how their vision was to offer a quick, instantly syncing web app more akin to the zippy responses of a desktop program (ie. Outlook) than the crotchety HTML email web apps of the time (ie. Hotmail). Funny then, that a decade later, MetroMail is billing itself as the best way to use Gmail on Windows 8. The tech world is like a long snake sucking on its own tail. MetroMail is nice to look at, however, with a smooth Metro-style interface and no Gmail web ads (provided you cough up for the full IAP version, that is).

Nesbox

FREE | BOO STUDIO | TINYURL.COM/LZTLVW4

If you turn to page 64 you'll find our advanced guide on how to make the perfect retro gaming machine — but if all you want to do is get a quick console fix on Windows 8.1 then Nesbox is the express route. Despite what its name suggests, this Flash-based multi-console emulator lets you play Sega Master System and Super Nintendo titles in addition to Nintendo Entertainment System games. Of course, unless you own an original copy of the games you're playing, the use of emulators is kind of verboten — and it's a decidedly grey area legally even if you do own them. But can you bring yourself to turn away when you hear those high-pitched chiptunes kick into gear?

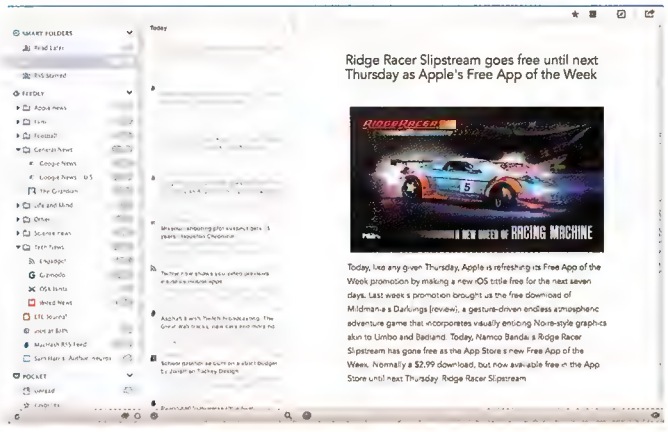
ReadKit 2.4

The best read-it-later desktop feed collator just got even better.

$8.99 | BALAZS VARKONYI | READKITAPP.COM

It's been almost a year since Google brought down the shutters on its RSS aggregator Google Reader, opening the doors for a new web feeder to emerge victorious. But that never happened, partly because of users' loyalties to a variety of existing sync services offering free and paid-for features.

Fortunately, Readkit works to corral all these services into one neat desktop interface, and with the arrival of v2.4 it does 'read it later' better than ever. Support has been added for syncing Fever, NewsBlur, Delicious and Pinboard, the latter two allowing you to keep offline copies of bookmarked sites. But even if you use none of the supported services, ReadKit now has its own native RSS sync engine, and it works flawlessly. The interface retains its pared-down, clean-cut look, with features like Focus mode making reading a pleasure – but navigation is now even easier thanks to keyboard shortcuts that let you jump from article to sidebar, and collapse and expand folders in a snap. ReadKit also keeps separate preference profiles for each account – even multiple accounts within the same service – so if you like to group or sort feeds differently to those piped in from Pocket, for instance, now you can. ReadKit's performance held up admirably when we drag-and-dropped articles between feeds, set up smart folders and drilled down to news stories using tags. And the cherry on top? The inline match highlighting upon a search query.


Ridge Racer Slipstream goes free until next Thursday as Apple's Free App of the Week
RIDGE RACER
A NEW BREED OF RACING MACHINE

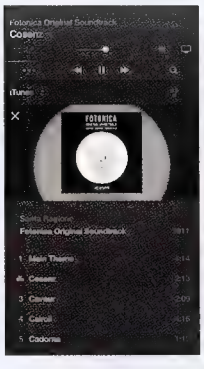
Mail Act-On 3

US$24.95 | INDEV | INDEV.CA

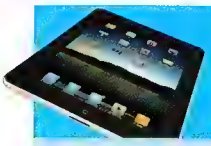
Mail Act-On is designed to make management of emails more efficient, letting you define rules, create single-key actions for filing and other workflow tasks, and adjust outbox messages before and after they're sent. Rules and settings live in Mail's preferences. Mail Act-On renames Mail's rules Inbox Rules and adds Outbox Rules and Act-On Rules. Outbox Rules can pre-process mail, for example changing the 'from' address when sending to contacts, delaying delivery, or appending text. Post-delivery, messages can be flagged, and alerts can sound. Act-On Rules are similar, but designed for applying to received email, for example to file it with a single keystroke. Making rules is simple — a similar process to creating Smart Albums in iTunes. Beyond shortcuts, actions can be performed using Mail Act-On's floating window. During a move action, mailboxes are filtered much like Spotlight results, and a Command-number shortcut can choose a selection once it's in the list. The process is faster than in the previous version, but the window has less clarity and more visual clutter. A new feature is templates; these enable you to create boilerplates that include tokens for names and subjects. The system is again usable, although didn't work on our test machines with assigned keyboard shortcuts, and wasn't quite accurate enough to trust with a blind 'quick reply'.

VOX 2

FREE | COPPERTINO INC. COPPERTINO.COM/VOX



VOX could be dismissed as a light, throwaway music player, but this app's delicate interface belies its power. Along with support for iTunes libraries, VOX handles FLAC and CUE ably, and organises tracks when a folder is dropped on its playlist. iTunes smart playlists, however, are ordered by artist then album, but iTunes support is otherwise sound. Although a bit fiddly, the interface is usable, responsive and packed with info. Audio geeks will squeal on noticing format information lurking above track titles, and a mouseover provides access to EQ, AirPlay and repeat settings. In the preferences, we were glad to see a gapless playback setting too. VOX remains awkward for large collections (despite the swift built-in search), but it's still a great iTunes alternative, especially for esoteric formats.



App Store » iOS APPS

BIAS — Amps!

Create a mind-blowing amp without blowing the fuses.

$10.49 | POSITIVE GRID | TINYURL.COM/OCU78LM

This app is simply the most impressive and realistic software-modelled amp we've ever heard. It's so good, you might be tempted to sell your heavy old Fender Super Twin Reverb and buy a dedicated iPad just to run it. Its initial hook comes from the slick interface, where you're presented with nine types of tone — from immaculate to gnarly, each with four presets — pretty much covering the history of guitar amplification. That means clean, jangly Fenders to Marshall tube monsters, all the way to amps that could never really exist in the real world because they'd melt the wall socket.

The 'Insane' category has some examples of amps so massive and monstrous, they'll scare your pets.

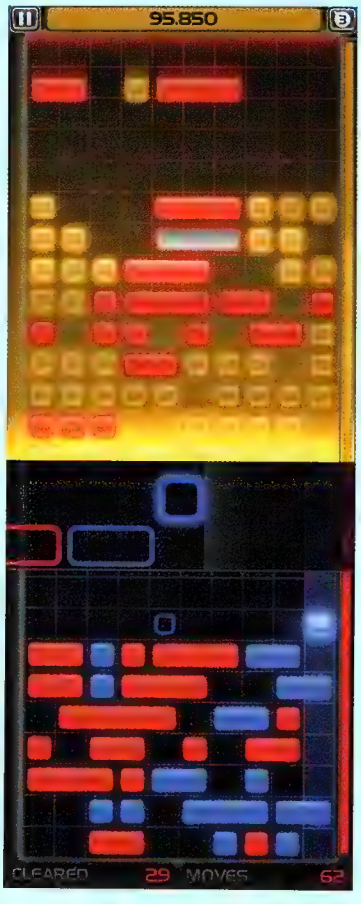
What really stands out is how excellent they all sound — even the one designed to make your electric guitar sound like an acoustic — and how much control you have.

The editor mode lets you tweak every aspect of a typical tube amplifier, from the power and preamp sections — each with multiple tube options — to cabinets and even the look of the enclosure. It does lack built-in effects, but it works with Positive Grid's JamUp effects app, and is compatible with AudioBus and IAA (Inter-App Audio), making it fit right in with most guitar, synth, effects and recording apps. Our one real gripe is that while you can create presets, there's no way to switch them using MIDI during live performances.

Partly Cloudy

$1.99 | RAUREIF | TINYURL.COM/OZC36GD

Partly Cloudy is a good example of the way the app revolution gives developers a way to rethink how we present information. In a small circle in the middle of the screen, Partly Cloudy manages to tell you when it will rain (and how hard), how windy it will be, how warm it will be and when it'll get dark — all at a glance. There's more information dotted around, but it's brilliantly clever, making the most of the limited space on an iPhone screen. If all you want is a quick, no-frills glance-able weather app, you've just found it.



Slydris

$1.99 | RADIANGAMES
TINYURL.COM/QXVZQRS

Slydris is deceiving. With a well full of blocks, it looks like Tetris. And things fall from the top, like Tetris. And when you make a full row of blocks, they disappear, like Tetris. But it isn't like Tetris. It requires an entirely different set of thought processes, and it can take some time to get your head around that. The aim is that, by sliding blocks, you move them over gaps that they can fall into and create full rows, or create spaces that other blocks fall into. With every single move triggering a fresh set of blocks falling from above, you have to hope you can set off chain reactions of clearances, clearing away lines at a time. Slydris is more simple to play than it is to grasp. There are no time pressures, and you can stop and pick up a game any time, yet it still manages to pile on the tension — it's the perfect mobile time-sink.

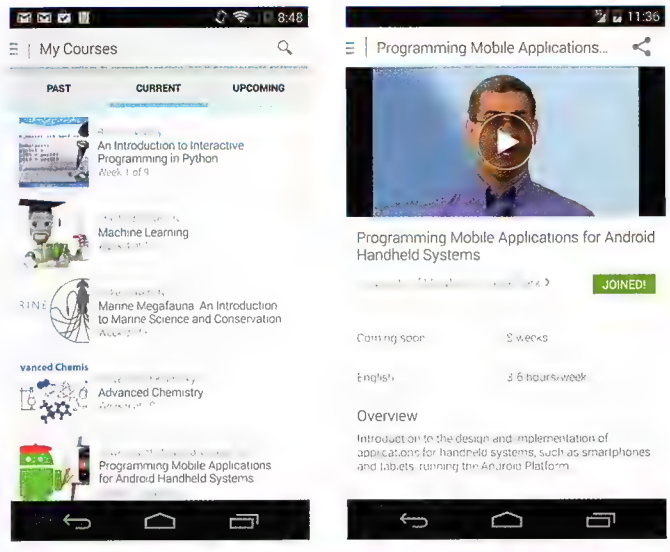
Coursera

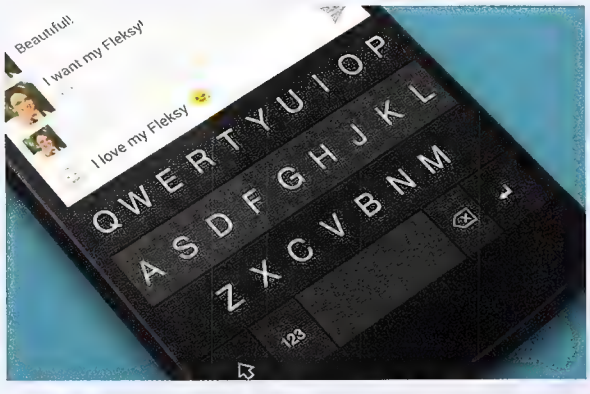
Free education, now on your Android.

FREE | COURSERA | TINYURL.COM/LKMX5UQ

Free online education providers are still a fairly new thing, and it's amazing to think of the massive potential that services like Coursera offer. Obtaining a tertiary education is an expensive and extremely time-consuming process that many find difficult to manage (especially if they're working or have kids).

While you might not get any letters after your name with it, Coursera, which has just launched on Android (it's already available online and on iOS), provides free lectures and courses from some of the most prestigious universities and institutions across the world, which you can access on your device at a time and place that suits you. In all there's more than 600 courses across 20 diverse subject areas, so you're bound to find something that appeals. Go ahead, we challenge you: Improve yourself!





Fleksy

FREE / $2.19 | FLEKSY | TINYURL.COM/QJVR09K

We've raved many times about the plethora of choices Android users enjoy when it comes to selecting alternative software keyboards to use on their device, and Fleksy is the latest option to come to our attention. In fact, when the app promised to be "so powerful that you can type without even looking at your keyboard" we knew we just had to try it. When you first start the app, Fleksy charmingly advises: "Don't worry about being accurate. I am extremely forgiving." And is it? Yes. Big virtual buttons and clever gestures make for some impressive ways to optimise your touchscreen typing, although, as is always the case with these sorts of apps, there is a learning curve before you're truly proficient with its workflow. Luckily, Fleksy features lots of winnable badges to spur you on, plus there's plenty of customisation elements — with the most ambitious being Fleksy's 'Invisible Keyboard', which amazingly lets you type with no letter keys visible. We wouldn't say we mastered it, per se... but we had fun trying.

Vic Gundotra +1'd this post
Josh Sacks
Public · 24 mins ago
Great article on Pseudoscience
Creationism doesn't actually
Those who shop at Whole Foods
Click a link...
thedailybeast.com
and it loads in the background
So you can keep using your current app instead of watching a page load!

Link Bubble

FREE / $4.99 | CHRIS LACY | TINYURL.COM/PTDLMSZ

Is it an alternative mobile browser? Is it a time-saver? Is it a clone of Facebook's chat heads? Yes to all three! In any case, Link Bubble is pretty cool. Usually, when you click on a link or URL on a mobile device, it fires up your web browser (and you have to wait around while the page loads in front of you). With Link Bubble installed, however, the app intercepts the link and loads it in the background — a bubble pops up on your display, letting you know when the page is loaded. Later, when you want to check the page, you just click on the relevant floating bubble (with its preview icon) and you can read it in Link Bubble's browser view. A great time-saver for busy web readers, with a nifty interface. The free version is pretty hobbled — you're limited to just one bubble floating on screen, and you can only intercept links from one app on your device. But give it a try, and if you like the functionality it may well be worth a fiver to unlock the full version.

Windows Store » WIN PHONE 8

Office Lens

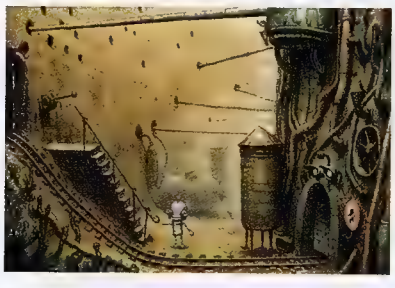
Shoot first. Share memos later.

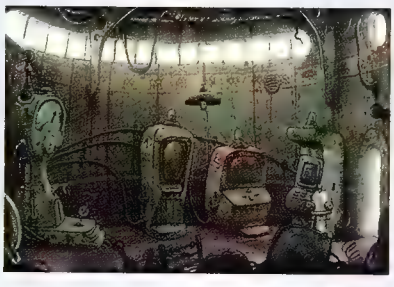
FREE | MICROSOFT | TINYURL.COM/PFMBW8B

As far as mobile apps go, Office Lens isn't exactly blessed with the most exciting role in life, is it? When we first heard about it, we wondered just what people would capture with their 'Office Lens'... Colleagues sitting at their desks looking glum? People chatting idly around the water-cooler? But the clever thing about this home-baked Microsoft app is it's actually a one-stop-portal for uploading images to your OneNote account.

Granted, there are a lot of other ways to photograph documents, business plans, white board scribbles and so forth, but Office Lens ensures all your shots end up in one convenient (and safe) repository, giving you one less work task to worry about managing.

And it gives you some simple editing tools to optimise images, so your records look their best. So nope, it's not fun, exciting or glamorous. But for workers under the thumb – and especially current OneNote users – Office Lens might just take a little friction out of the 9-5 grind.

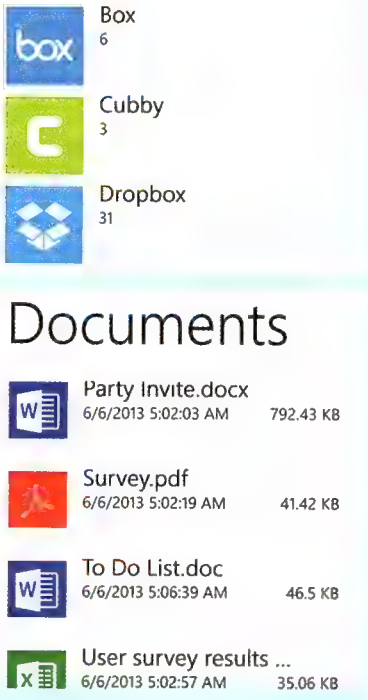




Machinarium

$4.99 | AMANITA DESIGN | TINYURL.COM/MEVW36G

Machinarium is not a new game. We reviewed its PC incarnation several years back when it first debuted on the PC, but since then its indie Czech developers, Amanita Design, have been busy porting it to just about every platform under the sun, with Windows Phone the latest format to be graced by this delectable point-and-click adventure title. You play as a humble robot, Josef, who's rudely thrown on the scrap heap. Reassembling yourself is the first puzzle to solve, then it's off to the ominous city to rescue your girlfriend and foil a dastardly plot by the villains of the piece. It sounds a bit inane, but the whole thing comes together beautifully with a lush, hand-painted art style reminiscent of a children's story book, complemented by wonderful atmospheric music and sound effects. Adventure titles have come back into vogue recently, with touchscreen devices a natural fit for the category, and *Machinarium* has played its part in their resurgence. Recommended.



Otixo

FREE | OTIXO | TINYURL.COM/KM7TC2X

Otixo has an interesting premise. With so many different cloud storage services available — Dropbox, Google Drive, SkyDrive/OneDrive and so on — wouldn't it be great if there was an app that tied them all together? Now there is. Otixo gives you single sign-on access to up to 29 different cloud providers, letting you transfer and copy files from one to another from within the app and search across them all simultaneously. It's a great idea, although likely of most appeal to a hardcore set of power users who rely heavily on a few services. But since most of these clouds only offer limited storage for free, it's also a way to maximise data bang for your buck, letting you cobble together a daisy chain of free cloud lockers. Note that while the app itself is free, the Otixo service — which is also available for Windows 8, iOS, Android and via the web app — is commercial, with various prices for standalone or bundled versions.

FSP

Rating of 90 from Tweak Town

80 PLUS® GOLD

AURUM CM Series

Premium Power, Gold Standard | Modular PSU Design

FSPMIA IC Technology

MIA IC™ Technology

The very first integrated IC that provides the best performance & highest protection for your system.

Unique Airflow Technology

Uniquely designed ventilation holes that allow natural aero dynamics to improve air extraction, keeping your PSU cooler than ever!

Intel Haswell

NVIDIA SLI READY

5 YEAR WARRANTY 5 YEAR WARRANTY

Product Range: 550 / 650 / 750W

* Specifications are subject to change without notice.

Distributed by

ALTECH COMPUTERS

www.FSPLifeStyle.com

Cooking up a killer Kaveri rig

APUs like Kaveri are the future for AMD, reckons Jeremy Laird, and there are already plenty of compatible motherboards to choose from.

Has AMD forsaken its performance PC processors? That's a very good question. Interestingly, its latest CPU architecture – known as Steamroller – is nowhere to be seen in the FX line of high performance CPUs.

Instead, Steamroller was launched in an APU chip packing both CPU and graphics in a single die. Of course, all of Intel's mainstream PC processors are actually APUs with on-die graphics. The problem is, AMD's APUs only extended to two CPU modules or four cores, whereas the FX line goes up to four modules and eight cores. The upshot of which is that if you want AMD's most advanced processor architecture, you can't have its fastest performing CPU. If that seems odd, there's a broader context at play here: a transition the PC is going through. It's been happening for several years now and while it has sometimes been a painful process, it does help explain AMD's strategy of late.

It's actually a pretty complicated transition. There's the whole CPU-GPU convergence thing. Then there's the shift from pure performance to performance-per-watt. And desktop to mobile. And big-iron boxes to cloud connected thin clients, not to mention game streaming.

Some of these issues overlap, but they are all pushing in the same direction, and that's away from hefty, standalone CPUs, towards more power-efficient, more highly integrated, more balanced systems. And guess what? That's exactly what AMD's APUs offer.

The slight snag with this shift is that the complexities of the APUs have tended to militate against AMD's traditional strategy of maintaining

Jargon buster

HSA

The idea of Heterogenous System Architecture is to have one chip with lots of specialised units within. So instead of some general-purpose CPU cores, you have a 3D graphics core, a 2D video and encode core, and maybe some crypto functionality. Dedicated hardware typically performs far faster than general-purpose CPU cores. The really clever bit is making this invisible to software, and having the code run on the most suitable part of the chip.

maximum backwards socket compatibility. Its latest APUs require the newish FM2+ socket and nothing else will do, which means forking out for a new motherboard when you decide to upgrade.

However, it turns out that isn't necessarily a bad thing. Whereas Intel places a pretty hefty tax on its motherboard chipsets, AMD platforms tend to be more accessible. What's more, the market as a whole has smelled the coffee and AMD APU platforms are no longer seen as simply the budget option. There are all kinds of FM2+ boards to suit the full gambit of budgets and usage scenarios. Nonetheless, the remit for an AMD APU-based rig is a little different from your traditional desktop tower. Handily, that's exactly where our round up of FM2+ boards comes in.

When we first realised that AMD had no immediate plans to stick its new Steamroller CPU architecture into its FX line of PC processors, it came as a bit of a shock. Steamroller was surely borked. After all, if it was any good then AMD would put it into FX chips. Or had the company finally run out of cash and couldn't afford to tool up for an FX chip based on Steamroller?

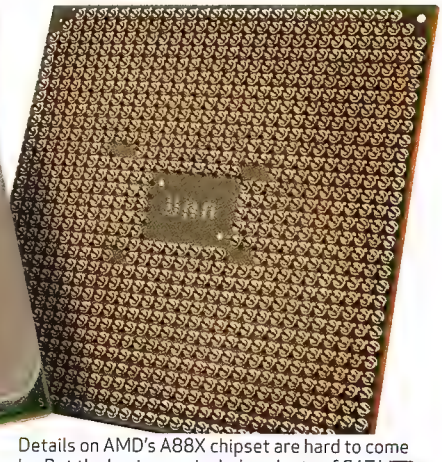
But several months down the line, we've developed a more nuanced view of all things AMD. This has made a system based on its latest APU – known as Kaveri – and a motherboard to go with it a much more appealing proposition.

The only bad bit that's proven to be true concerns Steamroller. It is indeed a dud. We don't mean that it's broken or makes matters worse for AMD – even if initial clockspeeds of Kaveri-based APUs are a little disappointing – but it isn't the big step forward that AMD needed in pure CPU-power terms. What we've also come to realise is that there is more to Kaveri than that, and there is a broader picture of what's happening to the PC than just CPU performance.

For starters, Kaveri marks the beginning of a new approach to computing for AMD, and maybe the PC in general. The buzz term here is HSA, or Heterogeneous System Architecture (see left). We've been through this in PCFs passim, but the basic idea is the ability for software to run in parallel and seamlessly across both the CPU and GPU. The details involve unified memory access for CPU and GPU, and essentially pushing serial work through the CPU and parallel through the GPU. We've been banging on about the concept for years, but AMD has finally built the requisite hardware.

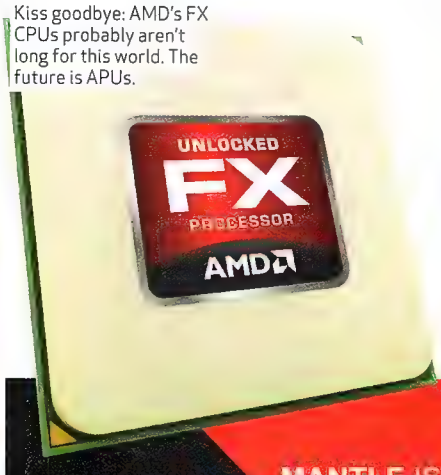
Then there's AMD's GCN graphics technology, which has been integrated into a CPU for the first time. Both the Xbox One and the PlayStation 4 use

AMD Steamroller CPU cores are disappointing, it's true. But we're beginning to think it probably doesn't matter.


Details on AMD's A88X chipset are hard to come by. But the basic spec includes plenty of SATA 6Gbps and USB 3.0 ports.

GCN, and it's also the graphics architecture that enables AMD's Mantle API, which promises to massively reduce CPU overheads in-game.

Oh, and let's not forget the whole Steambox thing and the consolification of the PC as a games device. Does that mean a smallish, power efficient PC that's gaming capable, or a truly thin client PC that is merely the target device for a video stream generated on a traditional big-iron desktop? Clearly, this is a pretty complex overall narrative, but the implications all point towards Kaveri being much more significant than the mere disappointment of the Steamroller CPU architecture.

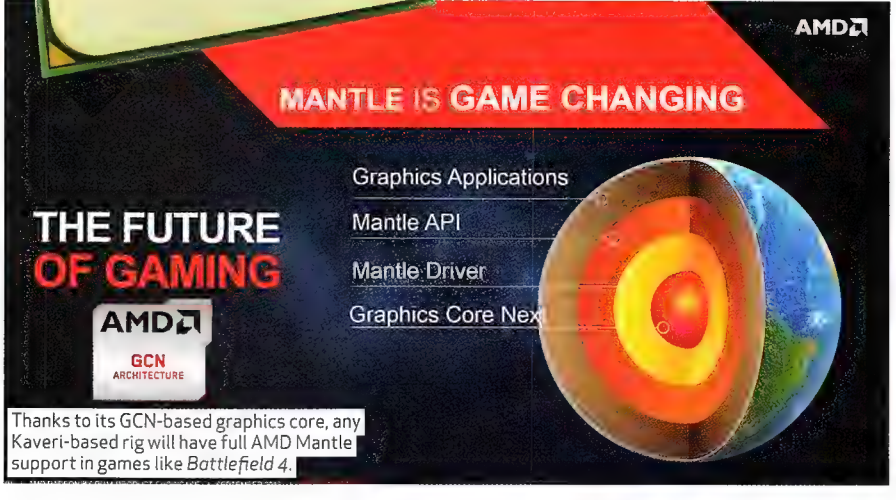


Kiss goodbye: AMD's FX CPUs probably aren't long for this world. The future is APUs.

PRIORITIES

All of that also puts a slightly different spin on the subject of motherboard platforms for Kaveri chips. For the most part, the same remit and the same metrics apply, but the emphasis and the balance of priorities look a little different.

Suddenly, form factor becomes one of the biggies. Kaveri isn't necessarily a bad choice for a conventional tower PC. But neither is it a particularly obvious choice. Instead, it is perhaps the perfect processor pick for almost everything except a traditional performance PC tower. Full-sized ATX rig on a super-tight budget? Yup. Puny mini-ITX box that still packs a punch? For sure. Something in between that deftly balances cost, proportions and performance? Definitely. With that in



Thanks to its GCN-based graphics core, any Kaveri-based rig will have full AMD Mantle support in games like *Battlefield 4*.

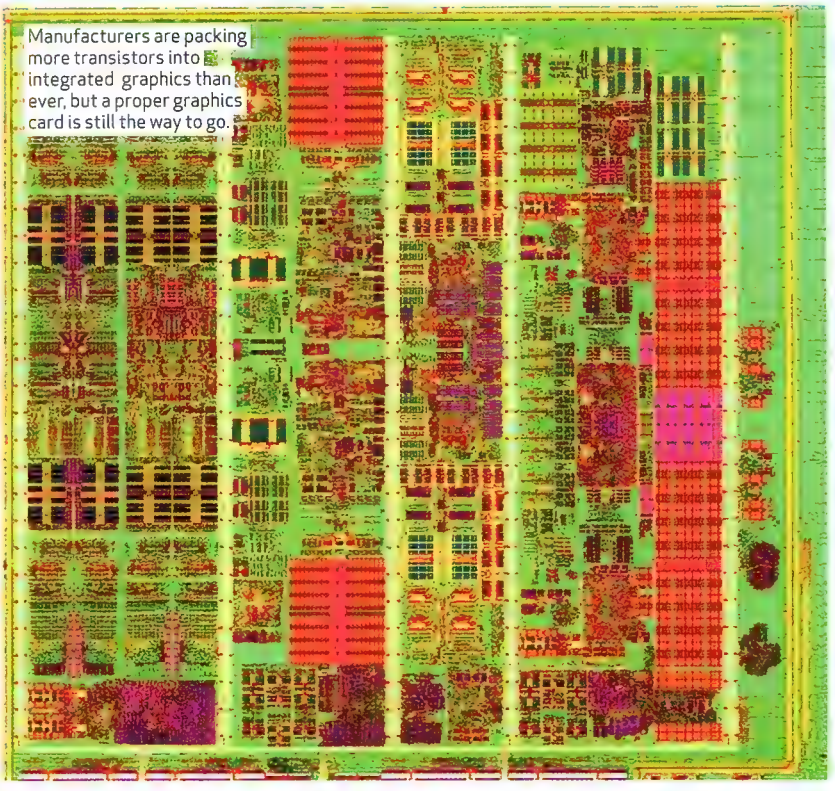
Console on a chip?

With both the Xbox One and PlayStation 4 now based on AMD CPUs cores and AMD GCN graphics, there's a comparison begging with the Kaveri APU. You can buy Kaveri for a fraction of the price of those consoles, even factoring in the cost of a new motherboard, memory and storage.

The easiest comparison to make involves graphics. The top-spec Kaveri is sporting 512 AMD GCN cores to the Xbox One's 768 cores and the PS4's 1,152 cores. Kaveri, meanwhile, clocks at 720MHz max as standard, compared to around 800MHz for the consoles. Of course, clocking up a Kaveri is easy enough, and 1,000MHz or so is definitely possible.

Suddenly, you're looking at a cheap APU with roughly the same shader power as a next-gen console. Very interesting. In reality, however, the comparison starts to look less rosy if you dig a bit deeper. In terms of ROPs and texture units, Kaveri scores eight and 32 to Xbox One's 16 and 48 and PS4's 32 and 72, but arguably the biggest snag here is main memory bandwidth.

Kaveri shares at most around 20GB/s for both CPU and graphics thanks to its dual-channel 64-bit DDR3 memory bus. It's the weakest part of the Kaveri package and frankly not up to supporting a proper gaming graphics core. As for how much bandwidth the two consoles have, much depends on how you do your measuring. But by any sane metric, both have at least five times the bandwidth of the Kaveri and the PS4 might be closer to 10.



Manufacturers are packing more transistors into integrated graphics than ever, but a proper graphics card is still the way to go.

The harsh truth then is that Kaveri is neither a console killer nor a console-on-the-cheap. It's notably off the pace, but the fact that it is not a million miles away by a few key metrics is still promising. It's not hard to imagine a next-gen AMD APU that closes much of the gap regarding ROPs, texture and memory bandwidth as well as offering comparable shader power at stock clock speeds.

In the old days, it was a question of when a high end PC would spank any given generation of consoles. If a cheap APU can do it, that really would be something.

Console killer: Kaveri compares surprisingly well to the latest consoles by some metrics.

mind, there are a few more minor features that are suddenly looking more critical. An mSATA slot certainly looks attractive when space is at a premium, for instance. The same goes for integrated Wi-Fi.

Equally, there are items that fall off the radar a little. Is outright overclocking ability critical? Probably not. Do we want to see debug ports, onboard power switches or voltage checkpoints? Not necessarily.

That's not to say that all the enthusiast-class clobber is instantly redundant. We have a mix of Kaveri-compatible boards on test this month that span the full spectrum – including a mini-ITX and a full ATX. It is more a question of weighing up the value of such features a little differently.

Now we've covered some of the broader issues to think about with a Kaveri-based system, what about the specifics such as chipsets? Here, it has to be said, it's hard to imagine AMD being much more opaque. Long gone are the days of bigging up chipsets when it comes to APUs like Kaveri.

In some ways, that makes sense. After all, as more and more features migrate onto the CPU or onto the APU die itself, the chipset becomes less critical. For example, with an APU based AMD rig, it's the APU that houses the PCI Express controller. Still, digging up any information on Kaveri supporting chipsets is difficult to say the least. They simply don't appear on the main AMD chipset web page.

But we've managed to unearth some interesting information. Kaveri chips themselves sport PCI Express 3.0 support with up to 24 lanes, so there's bags of external bandwidth on offer. Also, the integrated Radeon R7 branded GPU is pretty cool and there's support for 4K resolutions at 60Hz via DisplayPort 1.2 as well as dual-link DVI capability. Therefore, you can run a high-end desktop experience, barring 3D performance, with Kaveri's integrated graphics.

The most fully featured Kaveri-supporting chipset – and the one on which our test boards are based – is A88X. It's essentially a PCH chip that is codenamed Bolton D-4 and natively supports a maximum of eight SATA 6Gbps ports and four USB 3.0 sockets. There's also RAID support, gigabit Ethernet and up to three old school PCI interfaces.

It's a relatively up-to-date chipset, then, that ticks most of the boxes that matter. And that really only adds to the appeal. You can have a Kaveri-based system without compromising on features and functionality. On that note, it's time to check out some of the best Kaveri-compatible boards that money can buy.

Concurrent Dual Band Wi-Fi

Double bandwidth, Half interference,
Complete Reliability & Zero Headaches

DrayTek
Aust & NZ
www.draytek.com.au

2.4 GHz
Supported by most Wi-Fi devices

5 GHz
Less interferance with Wi-Fi devices

TAIWAN EXCELLENCE 2014

Dual Band

Giga-LAN

VLAN

PoE

VigorAP 900

Wi-Fi Access Point

Concurrent Dual Band (2.4 GHz & 5 GHz) means that your Wi-Fi data network will never be congested and you will have plenty of options to avoid interferences. Together with other network and security features, the VigorAP 900 is an ideal choice for your Wi-Fi data network.

- 802.3af Power over Ethernet (PoE-PD)
- Wi-Fi multimedia (WMM) Quality of Service features
- Comprehensive and trusted security features
- 4 SSIDs for each Wi-Fi band (2.4 GHz/5 GHz)
- 5 Gigabit LAN ports
- Embedded USB printer server
- 2 VLAN groups for LAN ports (wired) & SSIDs (wireless)
- Multiple operation modes for 2.4GHz Wi-Fi

i-LAN TECHNOLOGY

i-LAN Technology Pty Ltd trading as DrayTek Aust & NZ

www.i-lan.com.au (02) 9838 8899 sales@i-lan.com.au

CeBIT AUSTRALIA
cebit.com.au
OLYMPIC PARK
SYDNEY
05-07 MAY 2014

© Copyright 2014 i-LAN Technology Pty Ltd. All right reserved.

MINI-ITX MOTHERBOARD

$133 | WWW.ASROCK.COM

ASROCK FM2A88X-ITX+

A good performer in a small form factor.

Just a glance across a crowded room. A glimpse of its mSATA port. A flash of dual-HDMI. We've fancied this mini-ITX ASRock board right from the get go.

For starters, when it comes to AMD Kaveri-based rigs, we tend towards the tiny. Building a value small form-factor rig is a big part of the APU appeal. So, two points to Gryffindor for the mini-ITX form-factor.

Next up, SATA support. Board space is at a premium, obviously, but ASRock has still managed to squeeze in six SATA ports. You could argue that you're not going to be hooking up huge numbers of SATA devices to such a tiny board, but it's far better to have the option, and it gives this mobo desktop credibility.

At the other end of the storage scale, we're equally pleased to see an mSATA slot. In other words, the ASRock FM2A88X-ITX+ has all your storage bases covered. You can have a battery of SSDs in a big box, or slimline mSATA storage in a slinky chassis.

The rear panel looks good, too. There's optical S/PDIF, multi-port audio, a couple of USB 3.0 sockets and, critically, a pair of HDMI ports to go with the dual-link DVI output and VGA connectivity. DisplayPort is notably absent, which puts a slight limit on desktop appeal, but in small form-factor and home-theatre terms, HDMI is the important interface.

Integrated wireless networking adds to the appeal. It's N-spec rather than AC, which effects range and interference more than performance numbers. Unless you have pretty exceptional networking requirements, N is probably fine.

So, the feature set looks damn fine. What about the performance? At stock clocks, there's not a huge amount of variation between any of these boards, but the ASRock is one of the deviants, both for better and worse.

On the downside, SATA performance is a bit patchy. It's tricky to know why, but we can't help noting that the only other board to put in poor SATA numbers was the other ASRock effort, the FM2A88X+ KILLER. Clearly ASRock has messed something up with its SATA implementation. There's no denying that the sequential write throughput of below 300MB/s looks ugly when the competition is all well above 400MB/s. You probably won't feel that day-to-day since 4K random access performance is fine, but it's a bit off-putting.

On the other hand, the FM2A88X-ITX+ CPU core overclock of 4.4GHz is second only to the full-ATX ASUS A88X-Pro, and that's something you will notice. It also passes our integrated GPU overclocking test, with the required 1,020MHz graphics core and 2,400MHz memory frequencies. OK, the average frame rate of 60 is a little off the pace, but minimums are arguably more important and 49fps is a good result by that metric.

The FM2A88X-ITX+ makes for an awfully appealing mini-ITX package. It ticks a lot of our most-desired spec boxes, and the overclocking is surprisingly good for a mini-ITX board. OK, the SATA performance is a bit wonky and it looks pricey next to something like Gigabyte's F2A88XM-DS2, but we'd still give it a go.

Verdict

Features	★★★★★
Performance	★★★★½
Value	★★★★

Not quite perfect, but still a pretty compelling package, ASRock's mini-ITX effort pushes all the right buttons.

★★★★½

FULL ATX MOTHERBOARD

$139 | WWW.ASROCK.COM

ASROCK FM2A88X+ KILLER

More mainstream than usual for ASRock.

ASRock used to be all about bargains on pretty batty motherboards, but more recently it's delivered a nice line of more conventional high-end mobos. The ASRock Fatal1ty FM2A88X+ KILLER falls into the latter category.

Like the G1-SNIPER A88X, it's pitched at gamers courtesy of ye olde Fatal1ty branding. The gaming goodness starts with the Qualcomm Killer E2200 Ethernet chip. ASRock claims it prioritises online gaming traffic to reduce latency. You can also fire up a Windows-based app and fine-tune the traffic by hand.

Next up is Purity Sound, which includes shielding to reduce noise and interference, and support for 600ohm high-end headphones, plus the Fatal1ty Mouse Port, which is basically a USB port that supports the preferred 500Hz polling.

There's also what ASRock calls especially high quality digital VRM, with advanced pulse-width modulation that should translate into excellent overclocking. Dual-GPU support comes from the two 16-lane PCI Express slots, though the second slot only operates in four-lane mode electrically, and like ASUS, ASRock has seen fit to add an extra pair of USB 2.0 ports to the A88X chipset's native four-port capability.

The Fatal1ty even comes with the KeyMaster feature that amounts to auto-fire and anti-wobble mouse aiming for sniper shots. Really only the ASUS A88X-Pro out-features the ASRock with its three-way graphics, DisplayPort connectivity and eSATA ports.

But what of performance? Unfortunately, CPU core overclocking is a big disappointment and tops out at 4.2GHz. Again, hand-tuning will very likely release more MHz, but easy access to really high clockspeeds isn't part of the Fatal1ty package.

Nor is excellent sequential storage performance. Like its ASRock FM2A88X-ITX+ brethren, there's something rotten in the state of the SATA solution. Sequential write speeds below 300MB/s with our Samsung 840 EVO test drive simply aren't right.

That said, the Fatal1ty counters with excellent 4K random access storage performance, and you could argue that it's 4K rather than sequential that makes the biggest difference to the day-to-day responsiveness of your PC. Go figure.

The Fatal1ty also puts out some pretty nice numbers when it comes to overclocked integrated graphics, losing out only to the freakishly fast ASUS A88X-Pro by that metric. As for the rest, well, as we've said before, there's really little to choose between any of these boards when it comes to broader performance in Cinebench, video encoding, memory bandwidth and the rest at stock clockspeeds. That's symptomatic of the fact that so much functionality is now integrated onto the APU die itself that platform characteristics are becoming less critical. In plain English? Motherboards matter less and less to basic performance.

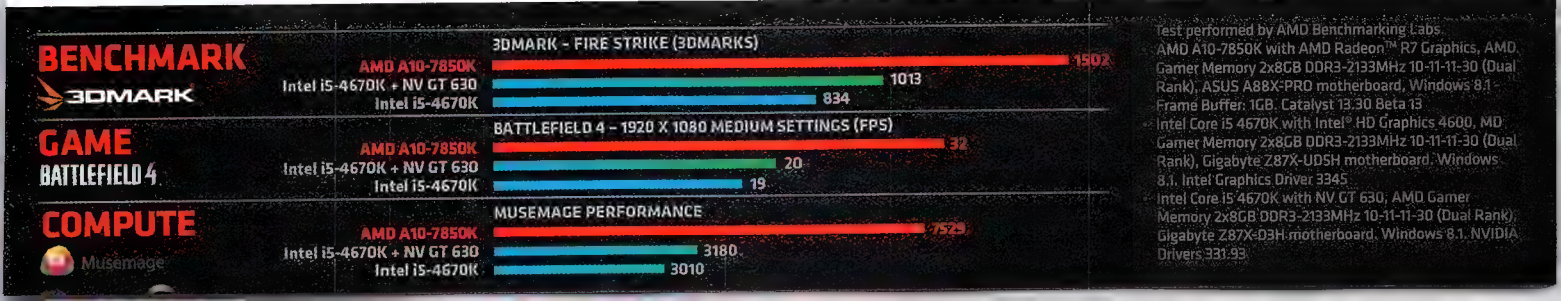
The ASRock Fatal1ty is a nice package, but you have to get the basics right before we'll award credit for the fancier features, and thanks to patchy SATA performance and poor overclocking, the Fatal1ty is a teensy bit of a failure.

Verdict

Features	★★★★½
Performance	★★★½
Value	★★★½

Some nice gaming-oriented features are compromised by patchy SATA performance and poor overclocking.

★★★½



Test performed by AMD Benchmarking Labs.
AMD A10-7850K with AMD Radeon™ R7 Graphics, AMD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), ASUS A88X-PRO motherboard, Windows 8.1 - Frame Buffer: 1GB. Catalyst 13.30 Beta 13
Intel Core i5 4670K with Intel® HD Graphics 4600, MD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), Gigabyte Z87X-UD5H motherboard. Windows 8.1. Intel Graphics Driver 3345
Intel Core i5 4670K with NV GT 630, AMD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), Gigabyte Z87X-D3H motherboard. Windows 8.1. NVIDIA Drivers 331.93

FULL ATX MOTHERBOARD

$162 | WWW.ASUS.COM/AU

ASUS A88X-Pro

Yes, it's expensive, but it still wins best value!

ASUS truly is the Borg of motherboards. So consistently good are its efforts, it usually feels like resistance is futile. Sure enough, one glance at our benchmark results and the shiny APC Picard pate seems at risk of becoming the dull slaphead of Locutus.

Don't worry if you've no idea what we're going on about. Just know this: the ASUS A88X-Pro delivers the numbers. Perhaps inevitably, it cranks out the highest CPU core overclock of 4.5GHz, and like all the other boards here, that number was achieved via little more than bumping up the CPU multiplier setting and letting the auto settings handle the rest. With some hand-tuning, it's likely that an even bigger frequency boost would be possible.

The really impressive bit is the A88X-Pro's sheer speed with the Kaveri integrated GPU overclocked. It's roughly 5% faster than every other motherboard. Quite how it pulls that off isn't clear – all the boards were given the same circa-1,020MHz GPU core and 2,400MHz memory speeds – but the results are clear (see page 52).

Elsewhere, admittedly, it is beaten on occasion. The Gigabyte F2A88XN-WIFI gives the best sequential storage performance numbers, for instance, and the A88X-Pro is only mid-table when it comes to Cinebench and video-encode performance. But frankly, the results by those metrics are so close that they're probably within the margin of error. You are never, ever going to notice the difference in practice.

On top of all this you get all the usual ASUS refinements. The BIOS menu is probably the best in the business, for instance, and the DirectKey button on the board will get you into the BIOS without the need to hammer the Delete key into oblivion.

Then there are the specific advantages of the ASUS A88X-Pro. Most notable are the triple PCI Express 16-lane slots. Electrically, you can have dual 8x and one 4x slot, and therefore triple-way GPU rendering. Overkill for a board that's only compatible with APUs? Possibly, but the ASUS A88X-Pro undeniably gives you the most graphics options.

It also ups the ante when it comes to USB 3.0. Along with the four ports supported natively by the AMD A88X chipset (two on the back panel, two mid-board), ASUS has added an ASMedia USB 3.0 to provide an extra pair of USB sockets at the rear.

Then there's the full complement of DVI, HDMI, Displayport and VGA outputs for the integrated GPU, plus a pair of eSATA sockets on the back panel. You also get proper heat-pipe cooling for the PCH chip and the MOSFETs. We could go on, but by now you're probably getting the idea. The ASUS A88X-Pro beats all comers for features.

Of course, nothing comes for free, resulting in the steepest price tag of any board here, but it's really not that much more expensive than the rest. Ignoring the freakishly cheap and frankly fairly bare bones Gigabyte F2A88XM-DS2, it's only a little pricier than the most affordable of the fuller-featured options, which brings us to the bizarre conclusion that the most expensive board here also offers one of the best value propositions.

Verdict

Features	★★★★★
Performance	★★★★½
Value	★★★★½

Awesome features, great performance. OK, it's the priciest board on test here, but it still offers super value.

★★★★½

apc RECOMMENDS

MICRO-ATX MOTHERBOARD

$95 | WWW.GIGABYTE.COM.AU

GIGABYTE F2A88XM-DS2

Not as many features, but it is a micro board afterall.

Full ATX? Makes sense. It's the proper tower PC shizzle. Mini-ITX? Yup, it's what you need for a tiny PC. But microATX? At best, it's a niche form-factor.

Of course, any chassis that can take a full ATX board will also swallow microATX, but it is a bit betwixt and between in terms of size. Then again, there are a few small form-factor chassis optimised for it.

What's more, you could argue that microATX is the best compromise of all. In theory, it allows for a much smaller chassis than full ATX, but sufficient board space to avoid limiting features and functionality. That, surely, is the remit for the Gigabyte F2A88XM-DS2.

Or it would be if this wasn't such a budget-oriented board. For just $95, it's unrealistic to expect the F2A88XM-DS2 to pack anything like a full ATX feature set. And so it proves. The first thing you'll notice is the stingy SATA setup. Just four SATA 6Gbps ports are provided. There's no eSATA on the back panel either, or mSATA support.

As we've mentioned the back panel, you'll notice the video-out options are limited to DVI and VGA. The DVI port is dual-link, thank goodness, but the lack of HDMI makes this less attractive as a proposition for a cheap home theatre rig or living room game box. The analog audio-out doesn't offer full surround, if you care about that sort of thing, and there's no digital S/PDIF either.

That said, if we're honest, nearly all of those objections are non-critical. For an SFF PC, four SATA ports are probably enough. Most people only need analog stereo audio out, and the DVI port will actually drive most 1080p HDMI displays with an adapter. Like we said, for $95 you have to keep your expectations in check.

What the extra board size does buy you, however, is a single lane PCIe slot and an old-school PCI port. Depending on your needs, both could be either very welcome or entirely irrelevant.

Either way, it's probably performance that's going to make or break the Gigabyte F2A88XM-DS2 as a budget proposition. Perhaps not surprisingly, this isn't a great overclocking board. All the options are there in the BIOS, but we hit the wall at 4.1GHz – well down on the 4.5 GHz achieved with the same APU by ASUS' full-ATX A88X-Pro.

Elsewhere, the news is better. The F2A88XM-DS2 has no problem running the integrated GPU at over 1,000MHz, with memory at 2,400MHz for much improved bandwidth. The performance of the SATA implementation is nice and solid too, albeit nothing special. Likewise, there's little to choose between any of these boards running a high-end GPU for gaming at stock clockspeeds. Indeed, it could be argued that the AMD Kaveri chip isn't well suited to high end gaming; its CPU cores aren't really up to keeping a powerful 3D card busy. But then we're back to value and being reasonable about expectations. Pairing Kaveri with a really high-end GPU isn't going to make sense on any motherboard.

Instead, with the right chassis and a mid-range GPU, this board will make for an affordable and effective budget gaming box. You can't say fairer than that.

Verdict

Features	★★★
Performance	★★★½
Value	★★★★★

Adequate performance, a pretty stingy feature set and damn cheap. Just remember it's not a mini-ITX board.

★★★★

apc RECOMMENDS

MINI-ITX MOTHERBOARD

$139 | WWW.GIGABYTE.COM.AU

GIGABYTE F2A88XN-WIFI

Still a good performer, even with the sample troubles.

There's one in every test — the review sample that's not quite right. If the Battle of the Somme involved hurling broken motherboards at the enemy, the result would have looked a lot like the *APC* test bench after day two. Dead boards lay strewn across the land.

But enough of the borderline tasteless digressions. This time, it was the Gigabyte F2A88XN-WIFI that proved a bit flaky. As the benchmarking process progressed, it became clear that something wasn't quite right. First it was the odd sluggish moment, like 30 seconds of unresponsiveness as soon as we hit the Windows desktop, but the real problem came with our integrated graphics testing. It wouldn't get through the *Rome II* benchmark without falling over. That was at stock clockspeeds. Overclocking the GPU was completely off the menu. Oddly, it had no problem running the more GPU-intensive Heaven benchmark.

We've no doubt that we just got unlucky with our sample, but it's a pity because this is a well-featured proposition that we'd have liked to see take on the ASRock FM2A88X-ITX+ for the title of best mini-ITX Kaveri board. It matches the ASRock with integrated wireless networking, but it ups the ante with super-fast 5GHz AC connectivity for a theoretical 867Mbps performance. You're not going to get close to that in reality, but then you're not going to get close to the ASRock's on-paper 300Mbps max either.

Elsewhere, the boards are closely matched. Both sport DVI and dual HDMI, digital audio, multi-point surround sound and a pair of USB 3.0 ports on the back panel. It's neck-and-neck stuff. Putting aside the integrated graphics bork, the benchmarks are a case of tit for tat, too.

Gigabyte has the edge in terms of storage performance, with the fastest sequential reads and writes here, while the ASRock puts out some seriously duff sequential numbers. On the other hand, it's the ASRock that cranks up the CPU core clocks to 4.4GHz — a very nice result for a mini-ITX board.

The Gigabyte F2A88XN-WIFI only manages 4.2GHz. Gigabyte has added a few nice little extras too though, including phone-friendly quick-charging from its USB 3.0 ports.

It's a very nice package, and we're confident that the integrated graphics issues during testing are essentially a one-off thanks to a dud sample. The only problem is that we can't be sure how the board would perform when overclocking the GPU.

Add in mediocre CPU core overclocking and there's enough to doubt the Gigabyte board overall. The one possible exception is using this board for a client box in a Steam-based game-streaming setup. Maximum wireless networking performance could well be a factor in that scenario, and the reduced interference that comes with the AC standard — at least until it's more common — could give a smoother, less laggy streaming experience. On that basis, this is probably the pick of the bunch if you're looking for a mini-ITX Steambox board.

Verdict

Features	★★★★½
Performance	★★★★
Value	★★★★

The slightly bork'ed review sample was a shame, but this is still looking like a very promising Steambox board.

★★★★½

FULL ATX MOTHERBOARD

$139 | WWW.GIGABYTE.COM.AU

GIGABYTE G1-SNIPER A88X

Great for sound, not so great for overclocking.

Gigabyte's Sniper series is all about gaming. Does that make for an awkward fit with any system based on AMD's Kaveri APU? After all, it's not exactly a gaming beast.

However, Kaveri makes a lot of sense for a certain kind of console-ish gaming box, and if that's your aim, a gaming-centric board has to be appealing. What's more, you're not paying much, or maybe even anything, for the privilege since the only board here that's cheaper is Gigabyte's sibling rival, the bargain basement F2A88XM-DS2.

So what does gaming-centric mean for an FM2+ motherboard? First, it's a full-sized ATX board with four DIMM slots, allowing for a few more memory configuration options compared to the SFF alternatives. Even more significantly, there are two physical PCI Express 16-lane slots, enabling dual-graphics Crossfire gaming. You could question the viability of Kaveri for high-end dual-GPU gaming, but you can also imagine a scenario a couple of years from now when you'd want to give your rig a gaming boost by adding a second-hand graphics card. It could make sense.

Another really nice feature is the Audio Noise Guard. It's electrostatic insulation for the audio circuit to reduce interference and noise. How much you'll care about the likes of the swappable OP-AMPs (which allow for different audio amplifier characteristics) is another matter, but this board is clearly the pick of the bunch for audio enthusiasts.

Video-out is well catered for, with DVI, HDMI and VGA, the former supporting dual-link, and therefore 1600p and 1440p displays. There's no DisplayPort, which could be a long-term problem for 4K support, but you have the option of an add-in 3D card.

Of course, something has to give at this price point, so enthusiast-friendly frills like LED debug displays, on-board power and reset switches and voltage checking points don't form part of the mix. That said, we expected a strong showing in the CPU core overclocking stakes. The BIOS has all the CPU-tweaking options, but the 4.2GHz result is disappointing. Admittedly, that was in our quick and dirty testing. Spend an afternoon fine-tuning the settings and no doubt a better result could be achieved, but other boards given the same treatment managed up to 4.5GHz. The Sniper doesn't offer easy access to big CPU core frequencies.

For integrated graphics overclocking, we had no problem getting good numbers. Results of 1,000MHz-plus on the GPU core and 2,400MHz on the memory side for that much-needed boost in bandwidth are just a few BIOS tweaks away. We're not convinced that anyone buying this full-ATX board will want to use Kaveri's integrated 3D gubbins though, so that might be a moot point.

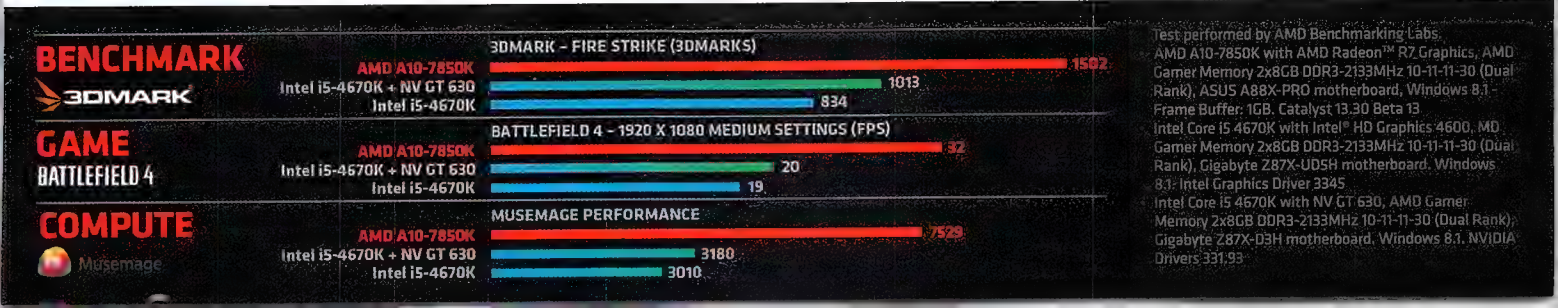
Overall, this feels like the best value of the big ATX boards and runs the ASUS A88X-Pro awfully close. The question is whether you want the ASUS' easier access to big CPU overclocks or the Sniper's superior audio. The choice is yours.

Verdict

Features	★★★★
Performance	★★★★
Value	★★★★½

Super value for a gaming-centric full ATX board, but slightly patchy overclocking.

★★★★



Test performed by AMD Benchmarking Labs.
AMD A10-7850K with AMD Radeon™ R7 Graphics, AMD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), ASUS A88X-PRO motherboard, Windows 8.1 - Frame Buffer: 1GB, Catalyst 13.30 Beta 13
Intel Core i5 4670K with Intel® HD Graphics 4600, MD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), Gigabyte Z87X-UD5H motherboard, Windows 8.1, Intel Graphics Driver 3345
Intel Core i5 4670K with NV GT 630, AMD Gamer Memory 2x8GB DDR3-2133MHz 10-11-11-30 (Dual Rank), Gigabyte Z87X-D3H motherboard, Windows 8.1, NVIDIA Drivers 331.93

"The Intel wireless solution performed flawlessly and will happily stream a 1080p movie while leaving enough bandwidth spare for other devices."

MINI-ITX MOTHERBOARD

$125 | WWW.MSI.COM

MSI A88XI AC

Can this cute little board compete with its larger brethren?

Right from the get go, the MSI A88XI is wooing HTPC builders with its mini-ITX form factor, HDMI output, 7.1 channel audio and 802.11b/g/n/ac dual-band Wi-Fi.

Connectivity wise, the MSI board has four SATA 6Gbps ports that support RAID 0/1/5/10 – not exactly, overkill but still more than enough. It's also got dual RAM slots that can handle up to 32GB of 2133MHz DDR3. A full size PCIe 3.0 16x slot can accommodate a GPU and a half size mini-PCIe slot handles other upgrades – though the latter is taken up with the Intel AC 7260 wireless card. On the board itself you have a USB and USB 3.0 header connection, with the former supporting two ports. You also get two fan connections as well as a front panel audio header.

Round the back it's got six USB ports (two of them USB 3.0) and just for a laugh, a PS2 keyboard mouse combo port. You will have no issue connecting to a variety of screens, with DVI-D and HDMI ports as well as an occasionally-still-useful legacy VGA connection. It also has dual gold plated screw on fittings for the Wi-Fi antennas, a Gigabit LAN port and supports Bluetooth via the wireless card. The A88XI has the standard 3.5mm audio I/O jacks but for real audio quality you will want to take advantage of the optical S/PDIF out connection.

Setting up the board is straightforward with generally enough room to access everything. The only exceptions are the awkwardly placed power connector and the Wi-Fi connection wires that trail across the motherboard.

Maybe it's a sign that this board was not destined for a gamers rig, but we struggled to get the *Rome II* benchmark to run without crashing. The good news is that it ran just fine on the integrated graphics. Overclocking is excellent and we had no problem hitting 4.4GHz with no stability issues. On the flip side, the MSI is not really aimed at overclockers as it does not let you manually adjust the CPU core voltages at all. Read and write speeds are on par with the competition, but don't do anything to really stand out.

The Intel wireless solution performed flawlessly and will happily stream a 1080p movie while leaving enough bandwidth spare for other devices. Switching to 5GHz can also be a great way to avoid interference – for us it solves the issue of our movies stopping every time we use the microwave. It would have been nice to see MSI drop the PS2 and VGA ports for something a little more modern, but no doubt someone out there will appreciate them.

While more expensive than some other A88X boards, after you consider the mini-ITX form factor and wireless card it's actually good value. If you want a tiny desktop, HTPC or a very casual gaming computer the MSI A88XI is well matched to the Kaveri APU platform – just don't ask too much of it and you won't be disappointed.

■ Lindsay Handmer

Verdict

Features	★★★★
Performance	★★★
Value	★★★★

A featured packed HTPC motherboard for an affordable price.

★★★½

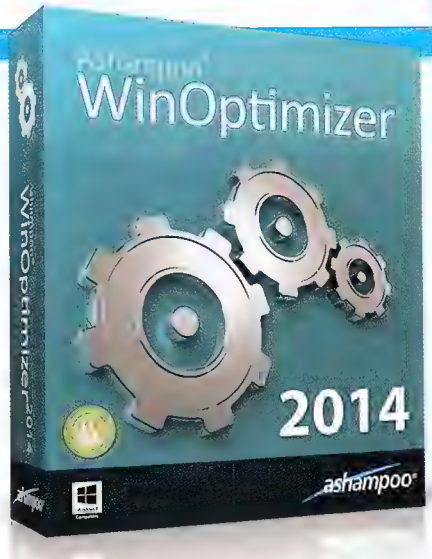
disc contents

» OUR SELECTION OF EXCLUSIVE FULL-VERSION PROGRAMS

ISSUE 402, MAY 2014

Maintain and optimise your PC

Clean up your system with Ashampoo WinOptimizer 2014



SPECIAL VERSION

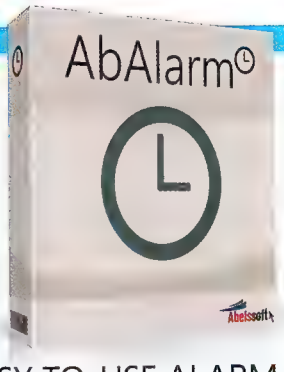
Ashampoo WinOptimizer 2014 is a virtual service technician to clean, optimise and protect your PC. Like any other machine, computers require maintenance at regular intervals to ensure smooth operation. Relying on built-in facilities alone, though possible, is a daunting task that requires intricate knowledge as well as constant efforts to keep up to speed with technical developments. Don't let background tasks take time away from you! Let Ashampoo WinOptimizer 2014 handle system complexity while you focus on what computers were made for — to get your work done! Ashampoo WinOptimizer 2014 provides over a dozen tools that help clean, speed up, and maintain your Windows computer.

SIMPLIFY TASKS

Create your own hotkey shortcuts with 1-abc.net Hotkey Organizer

FULL VERSION WORTH $22

How much time do you waste each day getting your computer to perform tasks? Using the mouse to navigate between program menus, drop-downs, taskbars and windows can take forever! 1-abc.net Hotkey Organizer lets you create hotkey shortcuts to maximise your speed and efficiency. With 1-abc.net Hotkey Organizer you can create global shortkeys to have faster access to everything, and with broad support for whatever key combinations you want you can be sure to never come into conflict with established system keyboard shortcuts.



EASY-TO-USE ALARM CLOCK

Keep on top of everything with Abelssoft AbAlarm

FULL VERSION WORTH $22

AbAlarm is a small and easy-to-use alarm clock for your PC. Give AbAlarm a specific time or the number of minutes to count down, and let it remind you automatically — with a text message and sound of your choice. You need never again forget your favourite TV show, nor to get your pizza out of the oven in time. AbAlarm can also perform scheduled actions, such as automatically open a web site, shut down your PC, or simply play an individual alert.

PLUS! ODOLITE: FULL SCI-FI GAME & VIDEO-EDITING ESSENTIALS TOOLKIT

SYSTEM REQUIREMENTS

- A DVD-ROM reader or burner.
- The *APC* disc is designed for use with up-to-date browsers (for example, Internet Explorer, Chrome, Firefox).
- The interface included on the *APC* disc requires a JavaScript-enabled browser.
- An internet connection may be required for online registration of software before use.
- The software packages on the *APC* disc have different system requirements. Software is included on the disc for Windows XP, Vista, 7 and 8.

BEFORE INSTALLING

- Check the disc using a virus scanner complete with the latest antivirus data updates. The disc was checked before burning, but new viruses are being discovered all the time.
- Back up any important system and data files. It is not recommended that the software contained on these discs be installed on production machines.
- If you have any questions regarding the use of the *APC* disc, click the 'Help' button at the top of the screen.

USING THE DISC

- Insert the disc into a CD/DVD-ROM reader or burner and your web browser should automatically load the interface. If not, launch your web browser and load the default.html file from the root directory of the disc.

HELP

- If you have any problems with the *APC* disc, please visit **www.apcmag.com/disc.htm**.
- *APC* provides no technical support for this disc or any software provided on it.

DISCLAIMER Future Publishing is not the licensor of the software and documentation on the enclosed disc (the 'software'). Rather, Future is merely a distributor of the software, and your use of the software is subject to any accompanying third party licence terms. You must carefully read and comply with any such third party licence terms, together with all instructions and README files that come with the software. Accordingly, to the maximum extent permitted by law, all software is provided by Future 'as is' and without warranty either express or implied, and Future will not be liable for any damage that you may incur as a result of using the enclosed disc. You should back up any important system and data files before using the enclosed disc. We recommend that you do not use the enclosed disc on a production machine. Nothing in this disclaimer excludes any warranty that may be implied by statute, which may include the Trade Practices Act. Notwithstanding the foregoing, if the enclosed disc is faulty or damaged, we will replace them for you. While we have taken all reasonable steps to check the enclosed disc for viruses, we cannot guarantee that it is free from viruses or other harmful code and you should check each disc using a virus scanner complete with the latest antivirus updates before use.

How we tested

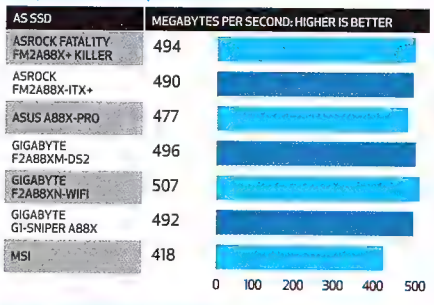
First up, the best way to uncover the full potential of these boards is to pair them with the fastest FM2+ chip you can buy. That'll be the AMD A10-7850K.

As for the specifics, we started with the usual suspects including Cinebench, memory bandwidth and x264 video encoding to achieve a good performance baseline.

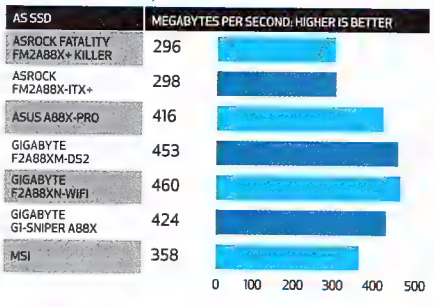
We reckon storage performance is also critical, so we hooked up a Samsung 840 EVO, fired up AS SSD and pulled down some sequential and 4k random numbers. Next up was CPU core overclocking using the multiplier setting, but allowing each board's auto feature to choose the CPU core voltages. Hand-tuning the voltages will typically give better results, but our test method shows what you can expect to achieve without any overclocking expertise. It's very much a real-world number. Gaming performance is the last major metric, and we tested both integrated and discrete graphics. The latter took the form of an Nvidia Geforce GTX 770. For integrated performance, we tested the chips at both stock clocks and overclocked to 1,020MHz core and 2,400MHz memory. For both discrete and integrated, we used *Total War: Rome II* on account of its notable scaling for platform performance. For the GTX 770, we tested at 1080p and Extreme quality settings. For the integrated GPU it was 720p and Medium settings.

So now you know.

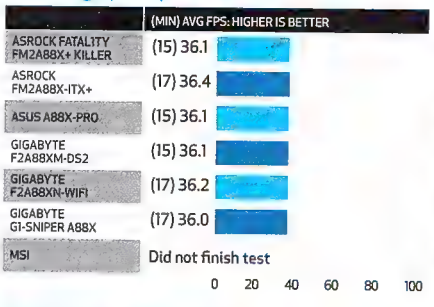
Sequential read performance



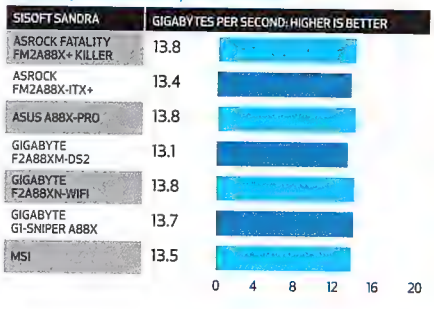
Sequential write performance



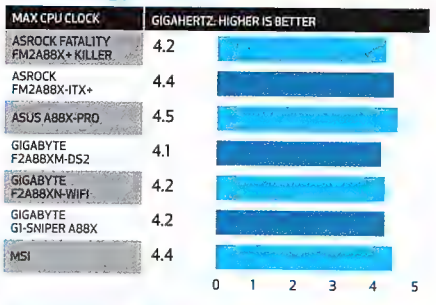
Discrete graphics performance


(MIN) AVG FPS: HIGHER IS BETTER
ASROCK FATALITY FM2A88X+ KILLER (15) 36.1
ASROCK FM2A88X-ITX+ (17) 36.4
ASUS A88X-PRO (15) 36.1
GIGABYTE F2A88XM-DS2 (15) 36.1
GIGABYTE F2A88XN-WIFI (17) 36.2
GIGABYTE G1-SNIPER A88X (17) 36.0
MSI Did not finish test
0 20 40 60 80 100

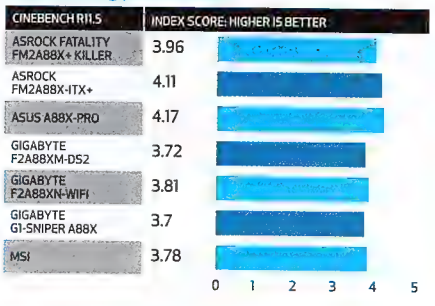
Memory bandwidth performance



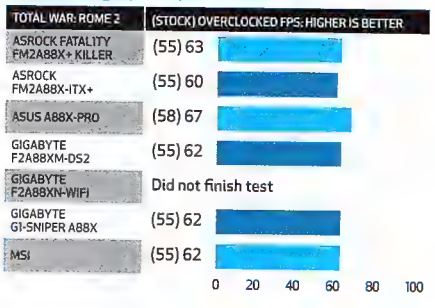
Overclocking performance



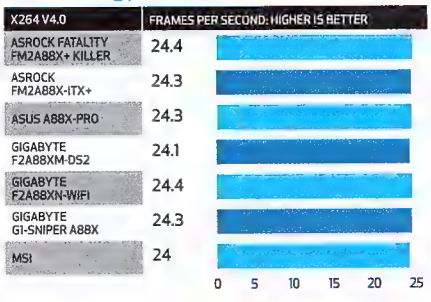
Overclocking performance



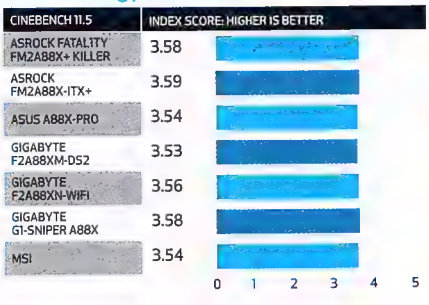
Integrated graphics performance


TOTAL WAR: ROME 2
(STOCK) OVERCLOCKED FPS: HIGHER IS BETTER
ASROCK FATALITY FM2A88X+ KILLER (55) 63
ASROCK FM2A88X-ITX+ (55) 60
ASUS A88X-PRO (58) 67
GIGABYTE F2A88XM-DS2 (55) 62
GIGABYTE F2A88XN-WIFI Did not finish test
GIGABYTE G1-SNIPER A88X (55) 62
MSI (55) 62
0 20 40 60 80 100

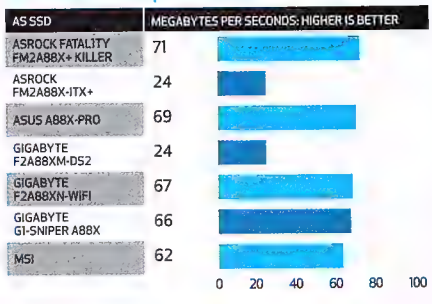
CPU encoding performance



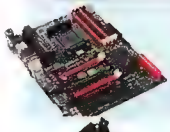
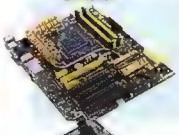
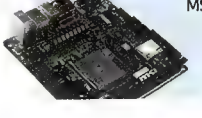
CPU rendering performance



4K random write performance

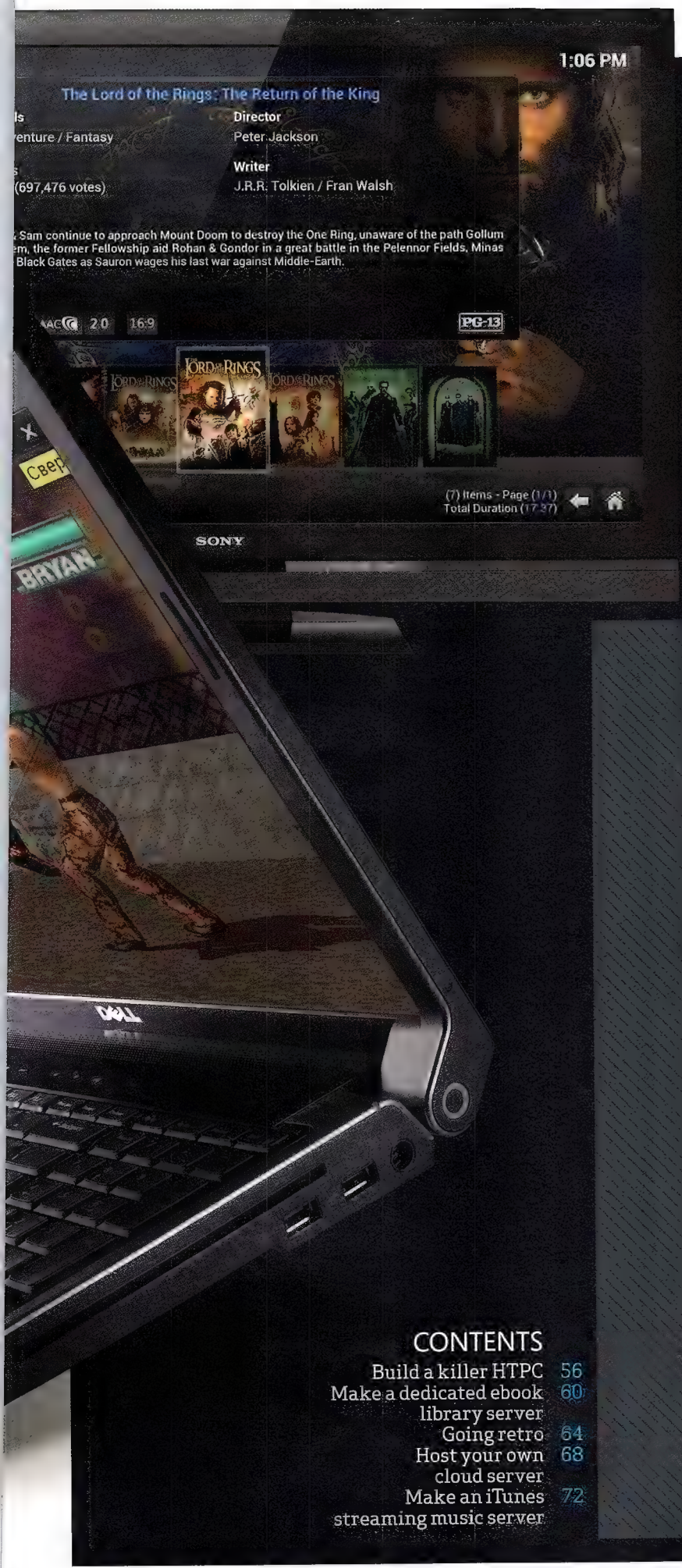


SPECIFICATIONS

	SOCKETS	CHIPSET	CPU SUPPORT	MEMORY DIMM SLOTS	VIDEO-OUT	STORAGE	USB 3.0	WIRELESS NETWORK-ING	REAR CONNECTORS
 ASROCK FATAL-1TY FM2A88X+ KILLER	FM2+	AMD A88X	AMD A SERIES APU, AMD ATHLON	4X DDR3	DVI, HDMI, VGA	8X SATA 6GBPS	6	NO	4X USB 2.0, LAN, PS2, DIGITAL AUDIO, 5-PORT SOUND
ASROCK FM2A88X-ITX+	FM2+ PS2, 5-PORT SOUND	AMD A88X	AMD A SERIES APU, AMD ATHLON	2X DDR3	DVI, 2X HDMI, VGA	6X SATA 6GBPS, MSATA, ESATA	4	N-SPEC	4X USB 2.0, LAN, DIGITAL AUDIO,
 ASUS A88X-PRO	FM2+	AMD A88X	AMD A SERIES APU, AMD ATHLON	4X DDR3	DVI, HDMI, DISPLAY-PORT, VGA	6X SATA 6GBPS, 2X ESATA	6	NO	2X USB2.0, LAN, PS2, DIGITAL AUDIO, 5-PORT SOUND
GIGABYTE F2A88XM-DS2	FM2+3-PORT SOUND	AMD A88X	AMD A SERIES APU, AMD ATHLON	2X DDR3	DVI, VGA	4X SATA 6GBPS	4	NO	2X USB 2.0, LAN, PS2,
GIGABYTE F2A88XN-WIFI	FM2+5-PORT SOUND	AMD A88X	AMD A SERIES APU, AMD ATHLON	2X DDR3	DVI, 2X HDMI	4X SATA 6GBPS	4	AC-SPEC	4X USB 2.0, LAN, DIGITAL AUDIO,
GIGABYTE G1-SNIPER A88X	FM2+ 5-PORT SOUND	AMD A88X	AMD A SERIES APU, AMD ATHLON	4X DDR3	DVI, HDMI, VGA	8X SATA 6GBPS	4	NO	4X USB 2.0, LAN, DIGITAL AUDIO,
 MSI	FM2+	AMD A88X	AMD A SERIES APU, AMD ATHLON	2X DDR3	DVI, HDMI, VGA	4X SATA 6GPBS	3	AC-SPEC	4X USB 2.0, LAN, PS2, 3-PORT SOUND, DIGITAL AUDIO

OLD GEAR: NEW TRICKS

DON'T LET YOUR OLD TECH GO TO WASTE! REPURPOSE YOUR UNUSED SMARTPHONE OR PC WITH OUR HOW-TO GUIDES


1:06 PM
The Lord of the Rings: The Return of the King
Director
Peter Jackson
Writer
J.R.R. Tolkien / Fran Walsh
(697,476 votes)
Sam continue to approach Mount Doom to destroy the One Ring, unaware of the path Gollum
em, the former Fellowship aid Rohan & Gondor in a great battle in the Pelennor Fields, Minas
Black Gates as Sauron wages his last war against Middle-Earth.
2.0
16:9
PG-13
(7) Items - Page (1/1)
Total Duration (17:37)
SONY
BRYAN
DELL

PROJECTS FOR OLD PCS AND LAPTOPS

We know we're probably preaching to the choir here, but boy computers are wonderful things. PC's are still, generally, the most versatile devices that most of us have in our homes, with the sheer amount of tasks and uses you can put one to being, quite-legitimately, beyond count. Like most pieces of tech, however, they do happen to age rather quickly, and a machine that was shiny and fast just a few years ago almost always seems brutish and unappealing when compared to today's best and brightest. That doesn't mean these older devices are necessarily useless, however, and often they're actually ripe for re-use at a single dedicated task.

There are in fact so many uses for an old PC or laptop that it can be tricky to pick just one. This month we've collected some of our favourites — as well as uses for old smartphones and tablets — into one mega feature, which covers everything from creating an ebook server to recycling a laptop as a dedicated retro gaming machine for playing your favourites from the 80s and 90s.

And don't be fooled into thinking you need a grunty machine to do these kinds of tasks — a desktop PC or laptop from the last 3-5 years generally has more than enough power to handle all the projects we've covered this month and, speaking from personal experience, turning an old rig into a dedicated media PC is one of the most rewarding tasks you can undertake.

Of course, there's heaps more projects you can use an old PC for than what we can cover in a single feature — or even a single issue — and if you like this sort of roll-up-your-sleeves stuff, do stay tuned because we'll be looking at more of these throughout the course of 2014!

CONTENTS

Build a killer HTPC 56
Make a dedicated ebook library server 60
Going retro 64
Host your own cloud server 68
Make an iTunes streaming music server 72

Jargon buster

HTPC
A home theatre PC that combines the capabilities of a PC with a software application that can playback multimedia.

x86
The term is used to signify compatibility with the 32-bit Intel 80386 CPU, and is the most common architecture for modern PCs.

Samba
The open source implementation of the SMB/CIFS networking protocol that is often used for sharing files between computers.

Build a killer HTPC

Turn a spare computer into a dedicated home theatre with Mayank Sharma.

Did you know that you can repurpose a spare computer to power your home theatre? It's certainly one of the best ways to put a lonely old PC to good use. It just doesn't make sense to spend your hard-earned cash on a dedicated HTPC device when you could put one together in no time at all for absolutely nothing. Yup, the software that powers an HTPC costs zilch.

The OpenELEC project produces a distribution that helps turn your computer into a media centre. It is powered by the XBMC Media Center application; this is an open source environment that can play all sorts of media including films, music and pictures. It is designed to feel at home on a desktop monitor as well as a hi-def TV or projector.

While you can install XBMC on top of another operating system such as Windows or Linux, the advantage with OpenELEC is that you get a streamlined distribution designed from scratch for one purpose only. Handily, you can use OpenELEC without any knowledge of its base Linux OS.

GET OPENELEC

OpenELEC doesn't put strain on precious hardware resources; in fact, you can run it on an old, underpowered system with little memory and a slow processor. It can perform on dated hardware because the project has several releases optimised for different platforms, such as the Nvidia ION, Apple TV, AMD Fusion and even the humble Raspberry Pi.

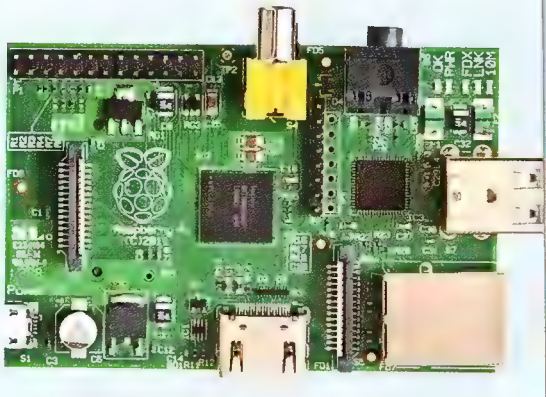
We'll use the catch-all build that works on any x86 Pentium 4 – and newer – computer. Head to the OpenELEC download page (**openelec.tv/get-openelec**) and download the stable generic build (**openelec.tv/get-openelec/viewcategory/8-generic-builds**) for your architecture (32-bit or 64-bit).

Fire up a terminal and change to the directory in which you downloaded the OpenELEC file. Extract the contents of the .tar file with the command `tar xvf OpenELEC-Generic*`. This will create a folder with all the extracted files in it, such as OpenELEC-Generic.i386-3.2.3.

Now plug in an empty USB drive and find out its mount point by typing the `sudo parted -l`

Raspberry Pi as a media centre PC

Extract as much juice as possible from your pint-sized computer.



Believe it or not, the puny 700MHz Raspberry Pi can double up as a very capable home theatre PC. The Raspberry Pi is able to display video at full 1,920 x 1,080 resolution. Thanks to the sound interleave of HDMI, it can also play back audio on the same channel as visual. Not bad!

While you can install XBMC on top of the Raspberry Pi's Raspbian distro, there are in fact several projects underway that aim to produce a dedicated media centre distro for the single-board computer. Unsurprisingly, the OpenELEC distro produces a version of its OS built especially for the Raspberry Pi. Simply grab the Raspberry Pi version from OpenELEC's web site and follow the brief instructions at (**tinyurl.com/b8borld**) to transfer it on to an SD card. This can then be used to boot the Raspberry Pi. Another popular media centre distro for the credit card-sized computer is Raspbmc (**www.raspbmc.com**).

Remote control XBMC

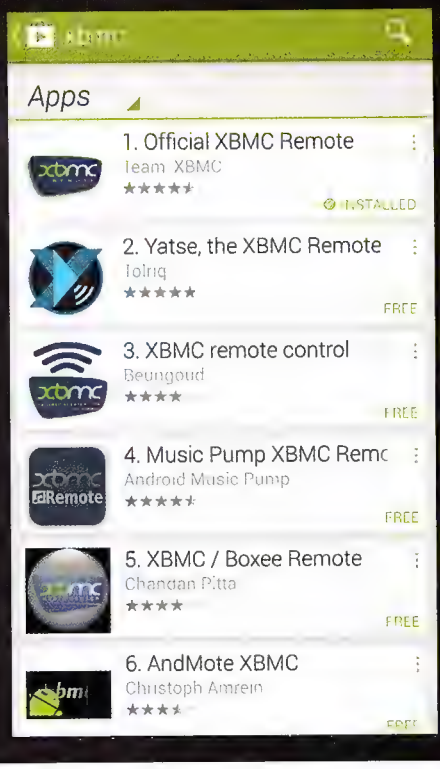
Once you have your HTPC up and running, disconnect peripherals like the keyboard and mouse. Next, hook up the HTPC with your HDTV or projector.

If the HTPC is connected to the network via a wireless adapter or an Ethernet cable, it can be accessed and controlled remotely. By default, OpenELEC runs the Samba service so it'll be listed like any other network location.

It is possible to control playback remotely from either a web browser or a mobile app. In OpenELEC, go to 'System > Settings > Services'. In the 'Remote control' section, enable the 'Allow programs on other systems to control XBMC' option. Switch to the Webserver section and enable 'Allow control of XBMC via HTTP'. Set a username and password to restrict access to your HTPC.

Now fire up a web browser and enter the IP address of your HTPC, such as **http://192.168.2.111**, which will bring up the default web interface. It is possible to install additional interfaces as XBMC add-ons. All installed web interfaces are available in the add-ons directory under your HTPC's IP address, such as **http://192.168.2.111/addons**.

You can even control the HTPC from your smartphone by downloading an XBMC remote control app from your app store. Point it to your HTPC's IP address, equip it with your login credentials and you're off!



The Google Play store contains several apps for remote controlling XBMC.

command in a terminal. The command will list all the disks attached to your computer including the hard disk.

You should see your USB device listed as /dev/sdX, such as /dev/sdb or /dev/sdc. Please double-check the address of the USB device otherwise you'll rewrite the contents of the wrong disk.

Change to the directory in which you have extracted the files and write them to the USB drive with the create_livestick script, such as `sudo ./create_livestick /dev/sdX`. Make sure you substitute the /dev/sdX part of the script with the correct location of your USB drive.

The script will then launch the OpenELEC USB installer. This will format the USB drive and copy files to it. When it's done, unplug the USB drive and move to the computer that you wish to turn into an HTPC.

Plug in the USB drive and boot the computer. The OpenELEC installation screen will greet you and will provide two options. The option selected by default will allow you to run OpenELEC in Live mode. The other option will install OpenELEC on the computer's hard disk. Highlight this option and hit Enter to continue.

The first screen of the OpenELEC installer warns you about the beta nature of the installer before moving on to the main menu. Some options on this menu are still under development and haven't yet been implemented.

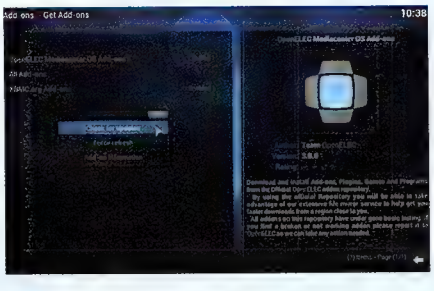
The only option that works flawlessly is Quick Install; fortunately, this is the one that we want. This option will automatically install OpenELEC on a selected hard disk.

After you select Quick Install, you will be shown a list of hard disks attached to the computer. Select the hard disk on which you wish to install OpenELEC. Over the next few minutes, the installer will wipe the disk, format a partition for OpenELEC and copy the necessary files to transform the computer into a HTPC.

Once it's finished working, you will be returned to the main menu. Simply select Reboot and you're done. When the computer restarts, it will boot straight into OpenELEC and launch XBMC.

How to install add-ons

Do more with your HTPC.



1 UPDATE
You can expand your HTPC by adding new features via plug-ins. Make sure you are connected to the internet and then go to 'System > Settings > Add-ons > Get Add-ons'. Right-click on any enabled add-on source and select the 'Check for updates' option.

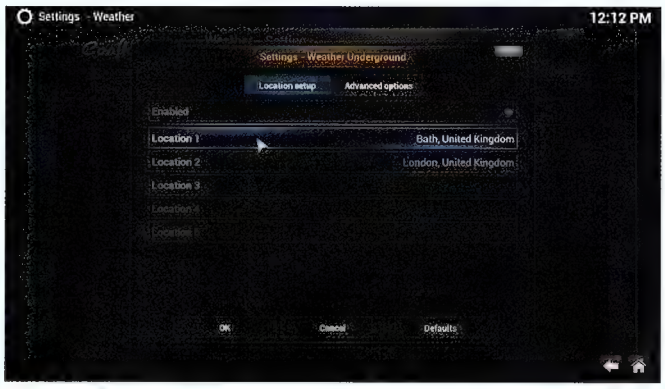
2 BROWSE
Repeat this for both enabled add-on sources. Now select the 'All Add-ons' option to browse the list of add-ons from both repositories. The add-ons will be listed under different categories, such as Music Add-ons, Program Add-ons and so on.

3 INSTALL
When you find an add-on you like, click on it to bring up its information screen. You will get several choices here, including the option to install the add-on. You can also update an already installed add-on and configure any available options.

Configure XBMC

Take charge of your media centre.

System info
10:28 AM
Storage information
Summary
Storage
Network
Video
Hardware
Filesystem Size Used Available Use% Mounted on
/dev/sdb1 7.4G 680.3M 6.8G 9% /flash
/dev/sda6 28.7G 24.4G 2.9G 90% /var/media/Ubuntu
/dev/sda8 11.4G 4.5G 6.4G 41% /var/media/chakra
/dev/sda9 31.6G 8.3G 21.6G 28% /var/media/korora
/dev/sda7 20.1G 5.7G 13.3G 30% /var/media/centos
/dev/sda10 36.5G 5.2G 29.4G 15% /var/media/sda10-ata-WDC_WD3...
/dev/sda1 102.7G 93.9G 8.8G 91% /var/media/ACER
XBMC 12.2 Git:97a9f05 (Compiled: Oct 17 2013)
CPU Usage: CPU0: 3.8% CPU1: 7.3%
Memory Used: 16%

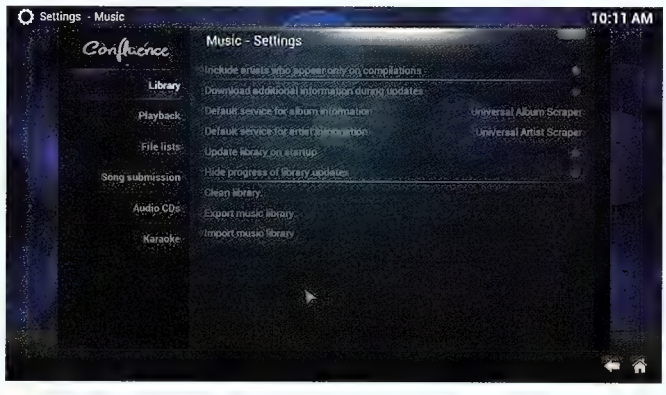


1 REVIEW SYSTEM INFORMATION

XBMC comes with plenty of different options that enable you to control various aspects of your home theatre PC. You will find the options under 'System > Settings'. For starters, you can take stock of the hardware by heading to the System section, where you will find detailed information on how different resources — including the CPU, memory and disks — are being utilised.

2 CONFIGURE LOCATION

Next, click on to the Weather section to configure your location. XBMC can track weather information for multiple destinations and is able to fetch this data from several web sites including Weather Underground and Yahoo! Weather. This section allows you to set up your location and switch to a different forecasting service, if you so wish.

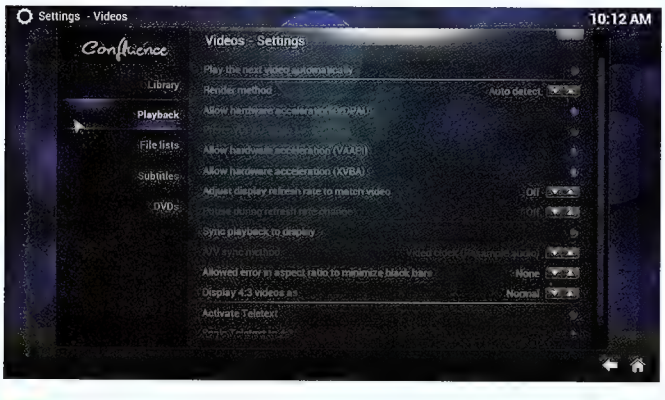


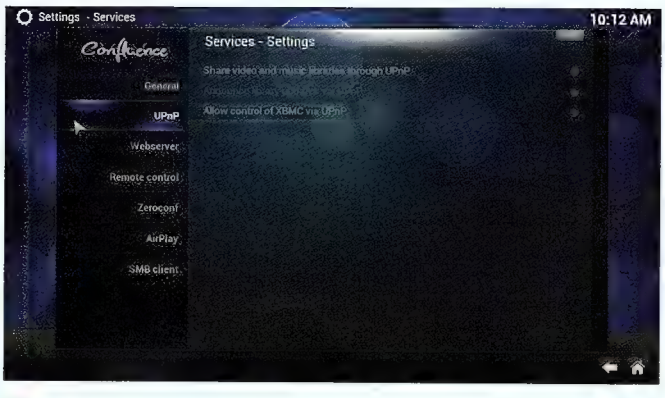
3 CHANGE APPEARANCE

If you are keen to customise the look of your home theatre PC, then make your way to the Appearance section. This menu includes settings to alter the various elements of the HTPC's appearance and even lets you download a choice of new skins. You can adjust the behaviour of the screensaver and the language of the interface, as well as alter the date and time settings.

4 MUSIC SETTINGS

Click on the Music section to alter the way that XBMC reads the tag information from the music files and uses it to display your library. You can also adjust playback settings like the crossfade that occurs between songs, for example. As well as this, there are options to select visualisations and submit your songs to various online services such as **last.fm**.





5 VIDEO SETTINGS

You can set several video playback options from under the Videos section. For example, you can ask XBMC to fetch plot information for media that you haven't watched, get thumbnails for actors when scanning media, and try to sync audio and video. You also get options to configure how XBMC renders subtitles.

6 ENABLE SERVICES

The Services section has some interesting network options. You can enable the UPnP server to stream media and allow XBMC to play content received via AirPlay. You can also allow remote control of your HTPC by enabling a web server and controlling playback via a choice of different web interfaces.

USING OPENELEC

Before you can start using XBMC Media Center, you'll probably need to configure some settings such as connecting the HTPC to your network. OpenELEC will take you through all the important settings as soon as you start a fresh install.

On the first screen of the setup wizard, you'll be asked to select your regional settings including your language and keyboard layout. In the next screen, you have to choose a hostname – this is used to identify the HTPC on your local network and to configure various network services such as Samba file sharing. By default, the setup will use the 'OpenELEC' hostname.

Next, you are shown a list of available network connections, including any available Wi-Fi access points. Select your network from the list and enter the password when prompted. After OpenELEC has connected to your router, it will display the IP address that is assigned to it.

The last step involves enabling and disabling services for file sharing and remote access. By default, OpenELEC has enabled the Samba file sharing services; these allow you to access the HTPC's hard disk from any computer on the network. This is particularly handy for moving media files in and out of the HTPC.

If you are an advanced network campaigner, you can also enable Secure Shell (SSH) access from this screen in order to access your files securely. The default username of the HTPC is 'root' and the default password is 'openelec'.

That's all there is to it. You can now pull out the keyboard and the mouse, plug in the high-defintion television and start using your HTPC to play any media.

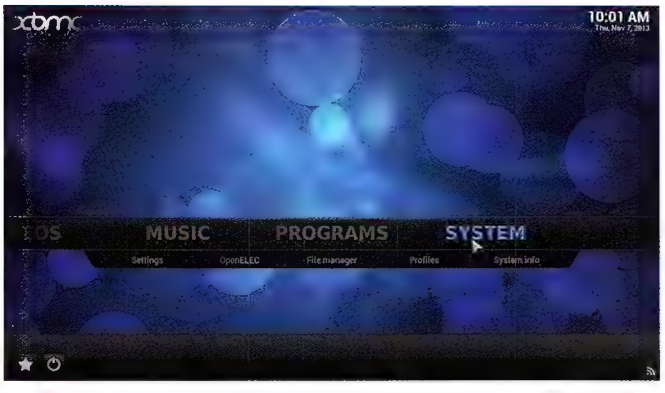
TOP TIPS

ANDROID REMOTE

You can download the freely available Official XBMC Remote Android app to remote control your HTPC from any of your Android devices.

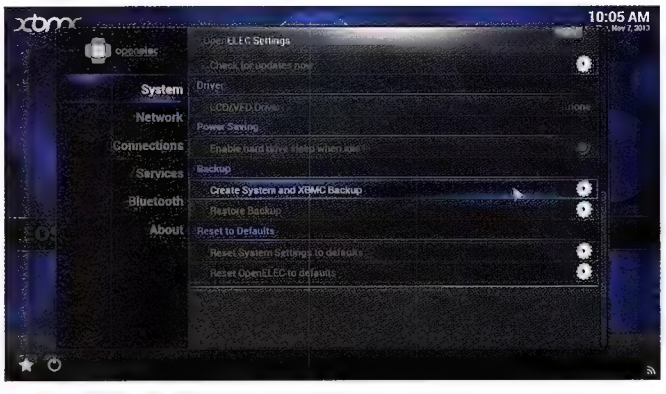
Set up OpenELEC

Keep your HTPC in top condition.



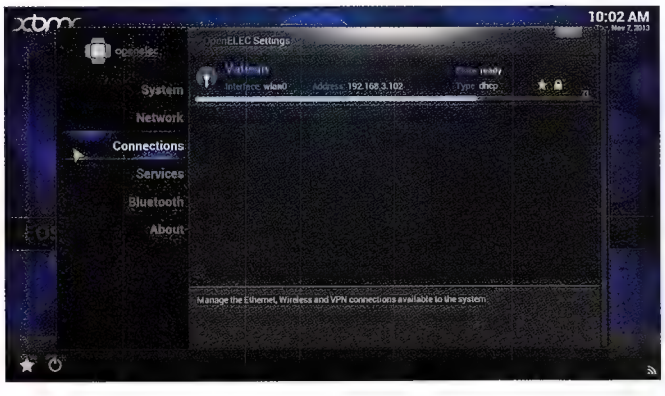
1 EXPLORE SYSTEM SETTINGS

In addition to the extensive XBMC settings, OpenELEC includes some settings of its own to help you maintain your HTPC. You can find these settings by heading to 'System > OpenELEC'. The settings are divided into different groups that allow you to manage various aspects of the home theatre PC.



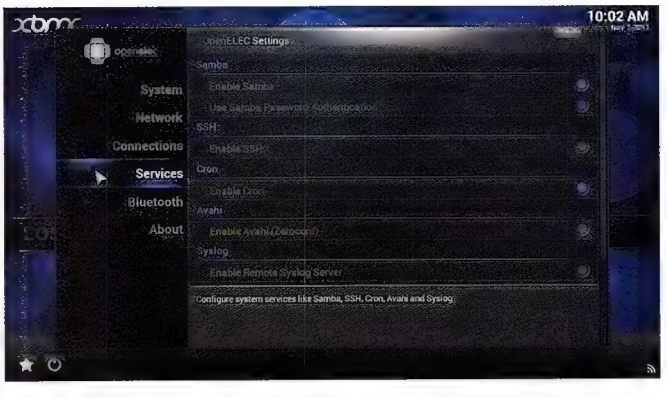
2 UPDATE AND BACKUP

From the System section it is possible to alter the hostname and keyboard layout that you previously set up in the wizard. In addition, you can check for any updates to the OpenELEC platform, create a backup of the HTPC, enable power saving features and also reset OpenELEC to its original default settings.



3 NETWORK AND CONNECTIONS

From the Network section you can activate wireless and wired Ethernet connections and configure VPN connections and network mount points. This section also lists the NTP servers. Head on over to the Connections section if you want to manage the activated network and VPN connections for OpenELEC.



4 ENABLE SERVICES

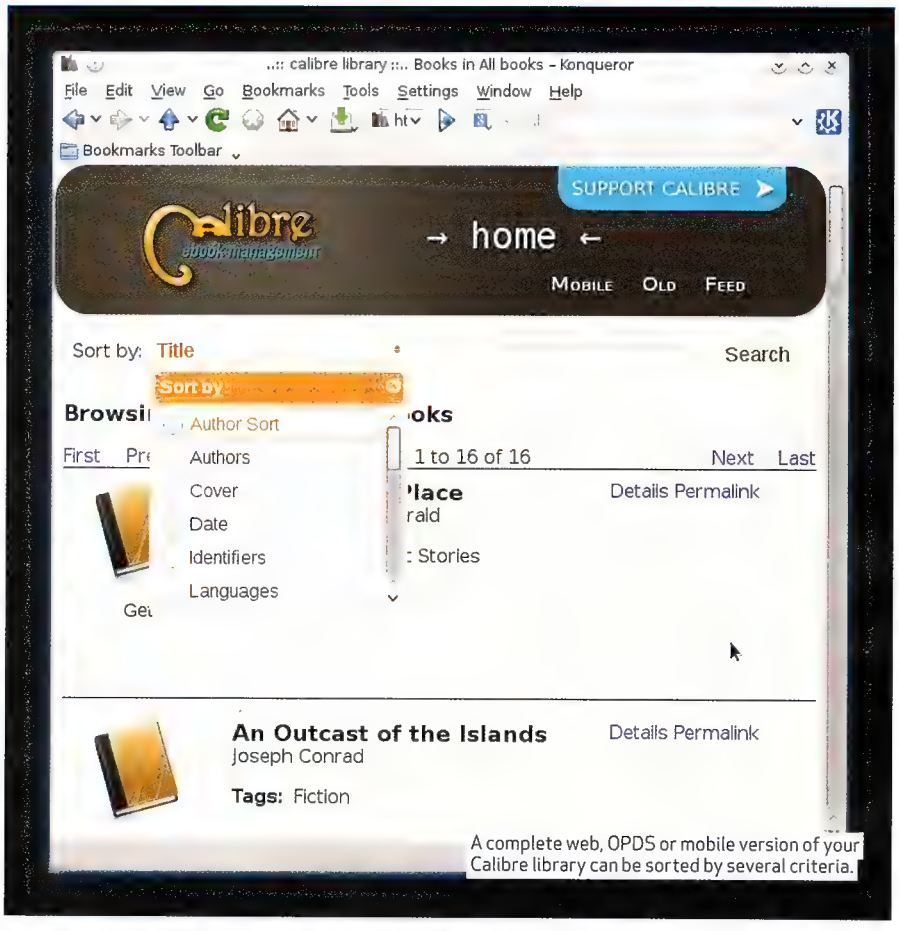
OpenELEC supports a number of different network services that can be activated by entering the Services section. By default, the Samba, Cron and Avahi services are enabled. Simply click on a service in order to activate it on your home theatre PC. Once you've visited all the menus, you'll have an HTPC that is customised for you.

Make a dedicated ebook library server

Marco Fioretti shows how to share your whole digital library from a Linux PC so your ebooks can always be at your fingertips, wherever you are.

Ebooks are great... provided that you can keep them well-ordered and indexed. However, sophisticated ebook managers, such as Calibre don't run on most portable ebook reading devices (for brevity, these will be called 'ereaders' from now on). So, how can Calibre's power be used to ensure that you always have a complete, up-to-date copy of your whole library in your ereader(s)?

It is possible to carry out continuous manual synchronisation, but this is boring and does have its limits. However, it is relatively simple to use the server capabilities of Calibre and other free software to manage a digital library and keep all of its content and metadata automatically available to you, even across the internet. You can even share with friends, relatives and colleagues – just ensure that any books and content you want to share with other people are definitely in the public domain.



A complete web, OPDS or mobile version of your Calibre library can be sorted by several criteria.

GET STARTED WITH CALIBRE

Calibre (**calibre-ebook.com**) is the most complete and well-known free ereader management software available today. This multi-platform application lets you download ebooks and the related metadata from many online sources and enables you to tag and sort all the titles, and convert them to several formats and interact directly with many popular ereaders. It is, however, only possible to carry out all these tasks with Calibre on a local scale, for example, on the same desktop on which the program was installed and keeps its internal database.

The default way to use Calibre to access all the ebooks stored and tagged on your desktop from your ereader involves creating a direct connection (USB or Wi-Fi) between the computer and ereader to allow the files to download manually. This remains the only way to have all your titles with you when you know you are going to be without internet access for a while.

In other situations, that system may be less efficient than making all your titles viewable from any web browser or ereader whenever you want, without having to download everything first. For example, if the same Calibre library needs to be shared by different ereaders belonging to the same user – or multiple users – then creating a centrally managed digital library makes perfect sense. This would work well for families, businesses or educational groups.

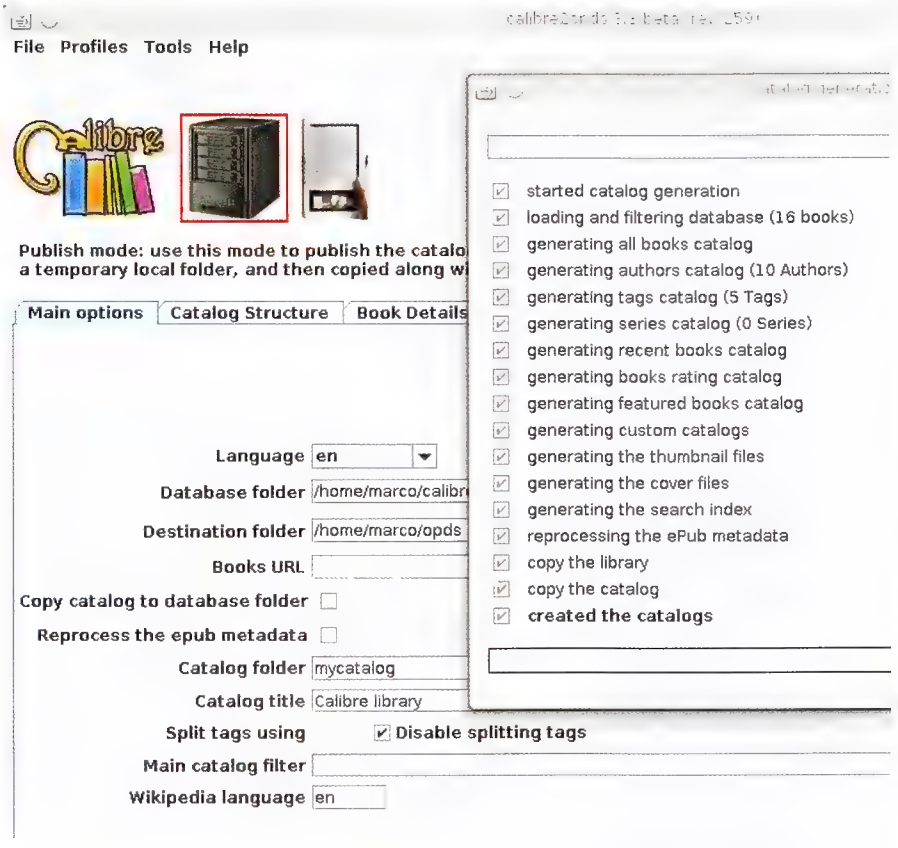
Perhaps most importantly, indexing, tagging and generally managing an ebook collection using a software program that is completely independent of any ereader saves time and makes backups so much easier. It is also the only way to be sure that you won't lose all of your legally acquired titles if your ereader suddenly breaks or if you want to change to a new model or brand.

It's worth considering keeping an ebook manager – or at least its products – on a Raspberry Pi or similar Linux minicomputer as well as your main PC. This means that your ebook library will always be available on the local network, even if your primary computer is turned off, away from home, broken or being updated.

The Calibre home page explicitly recommends that you download and install the latest stable version of Calibre from the command line, because the packages provided by Linux distributions "are often buggy/outdated". Whatever you may think of that warning, that other procedure may be the only way to get Calibre running on a server.

To begin with, check that Python (at least 2.6 at the time of writing) and the xdg-utils package are already available on the target computer. If they aren't, install them using the standard packages and procedures of your distribution.

Next, decide where you want to install Calibre. The usual Linux locations for software that's installed



As powerful as it is, Calibre can't do anything. The static web catalogues created by Calibre2OPDS are faster and offer many more options.

manually are /opt or /usr/local/bin, but it's entirely up to you where you put it. The Calibre installer will put everything in a sub-folder of whatever directory you tell it to use.

The web site also explains how to pass this parameter on the command line, in case you need to carry out a completely automatic installation.

Finally, copy, paste and execute at the prompt, as root or via sudo, which is the Python command shown on the web site. It will ask you where to put the Calibre files: download them to your chosen location and perform some configuration tasks such as creating symbolic links. Should it be necessary to remove the software at a later date, simply remove the Calibre folder that was created during installation. Bear in mind that this won't get rid of the symbolic links.

Once Calibre is installed, you can start its server component from the graphic interface by selecting 'Content-Share > Start Content Server' in the main menu. You can also check a box to make sure that the server starts every time you launch the Calibre GUI. By default, calibre-server running on a desktop computer creates a simple web site at the address **http://localhost:8080**. Here, you can browse your library by ratings, tags, authors or last entries. Details of each title – as well as links to download it in all the available formats – are included. There's also an OPDS feed, but this will be covered later on in the tutorial.

Of course, if this only worked locally, and only when the whole Calibre GUI were running it wouldn't be very useful. Calibre server function is placed in the program calibre-server. Configure your Linux distribution to always run this command at boot:

```
calibre-server --with-library=/path/to/calibre-home
```

Here, calibre-home is the folder containing the Calibre database and your ebook collection. The web interface will be available at all times, as long as the computer is powered on. The calibre-server program accepts options to set the size of the book covers, and allows you to select a user name and password. There are several other customisable parameters, which are all clearly explained at **manual.calibre-ebook.com/cli/calibre-server.html**. This is all you really need to know to make your Calibre library always accessible inside a local network.

PUT YOUR LIBRARIES ON THE WEB

Now that we've sorted the local network, let's see how to make a Calibre library accessible, no matter where its users are. Generally

Other 'server-like' parts of Calibre

This tutorial focuses on one thing: how to automatically serve ebooks managed with Calibre. That in itself is a really useful function, but Calibre-based automation can go much further. Several buttons and menu entries in the Calibre graphic interface are just shortcuts to the independent command line utilities listed in the Calibre CLI page (**manual.calibre-ebook.com/cli/cli-index.html**).

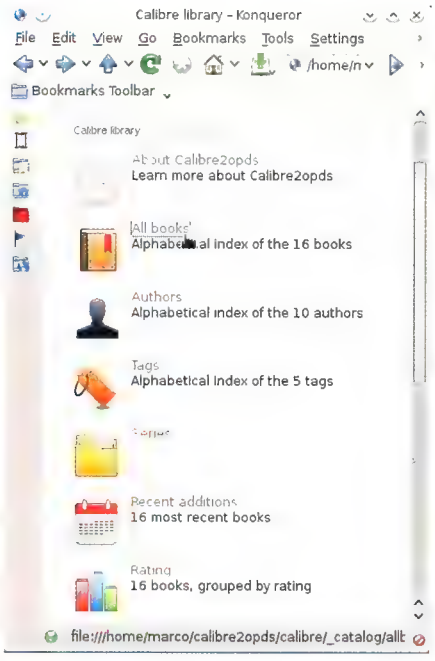
Nothing prevents you from using any one of those commands alone, possibly in shell scripts of all sorts. This means that once you have Calibre, you can automatise many operations related to the analysis, management and generation of ebooks. Until you are sure of what you're doing, remember to back everything up before experimenting.

The fetch-ebook-metadata program, for example, does just what its name suggests and makes it easy to add book metadata to any custom database you may need:

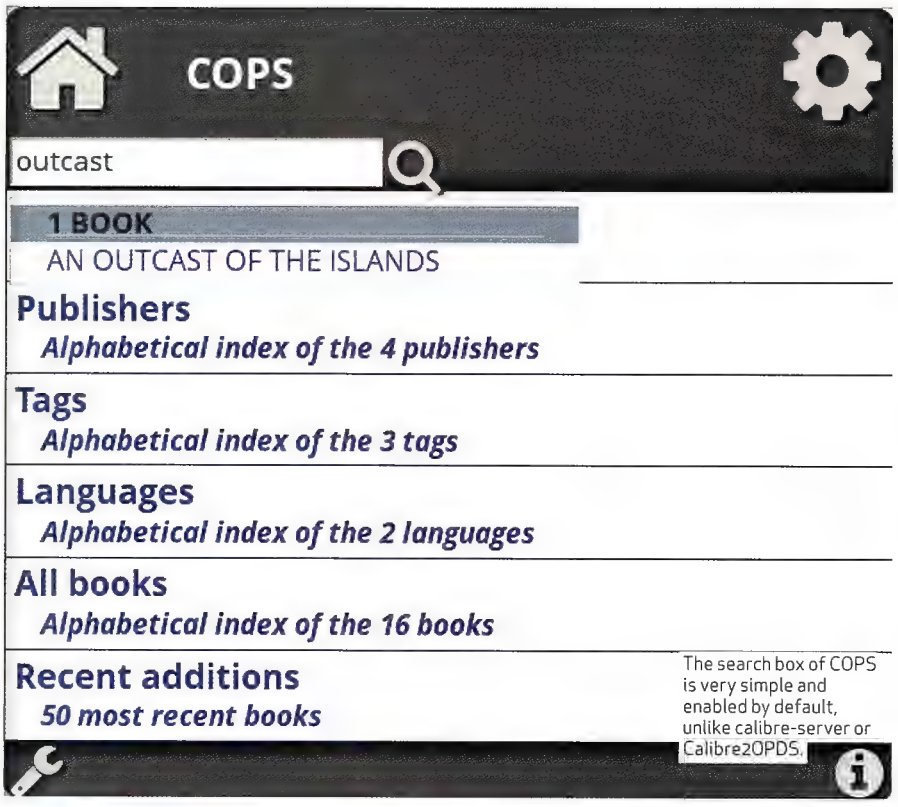
```
#> fetch-ebook-metadata -t 'The Lord of the Rings'
Title               : The Lord of the Rings (50th Anniv. Ed.)
Author(s)           : J. R. R. Tolkien
Publisher           : Houghton Mifflin Harcourt
Identifiers         : amazon:0618640150, isbn:9780618517657
```

Another field in which you can get a lot done, without ever opening Calibre's GUI, is ebook conversion and formatting. The utility called ebook-convert moves your titles from any format supported by Calibre to any other.

Ebook-polish "puts the shine of perfection onto your carefully crafted ebooks" while changing as little of their source code as possible: use it to add custom covers and jackets to all of the ebooks in your database.



The web version of a Calibre2OPDS catalogue looks clean and offers many ways to sort out your books.



The search box of COPS is very simple and enabled by default, unlike calibre-server or Calibre2OPDS.

speaking, there are four ways to obtain this result:

You can make your local Calibre server accessible from through internet.

You can install a standalone calibre-server on an external (virtual) computer in a hosting centre.

The same as option two, but install the calibre-server side by side with an already-running web server.

Use other programs to convert your Calibre database into HTML or OPDS catalogues.

Please note that these classifications are somewhat arbitrary. They certainly make it easier to describe the main differences among installation procedures and user interfaces, but that really is its only purpose. Feel free to use these categories as a starting point, and then mix them up as you wish. It is perfectly possible, for example, to adopt the fourth on a spare computer. By doing so, you would have an interface that is:

More flexible than the one provided by calibre-server.

Run through a web server that you manage and configure as you wish with passwords and encrypted connections etc. Always available to people in your circle both from your local network and from the internet.

Keeps all your ebooks inside your home or office.

The best option for you will depend upon your actual needs and on what computers are accessible to you. The first method is the correct one if the web/OPDS interface provided by calibre-server is enough and you don't want to store all your ebooks outside your home or office. Should you choose that route, all you would have to do is configure your internet firewall to allow connections to calibre-server, possibly on a non-standard port with the `--port` option.

Options two and three give you the same interface, but without being forced to open your local network in any way. Option four offers features that are not present in calibre-server and its main benefit is that your Calibre database will be compatible with cheap hosting accounts that don't let you install anything but static or PHP-based web pages.

Let's take a look at option 2. If the web server hosting your library had the domain name **www.example.com**, and you wanted your ebooks to be accessible at the URL **www.example.com/mybooks**, then tell calibre-server to listen on the standard port for web servers (80) and use the /mybooks prefix:

```
calibre-server --port 80
--url-prefix /mybooks --with-
library=/path/to/calibre-home
```

This solution has some drawbacks. The first is that this command only works if there isn't a normal web server already running and listening on TCP port 80. You could tell Calibre to use another port, but it may be

QUICK TIP

Always synced?

Continuously synchronising your ebook readers with Calibre? No thanks. Besides being terribly boring, it has several serious limits.

OPDS what?

If you have been using the internet for more than a few months, you are probably aware of RSS feeds. (And if you're not, you really should do something about it!) Quite simply, RSS feeds are lists of titles — with links — of all the latest news from a given web site in an open format that is readable by many different programs.

OPDS is short for the Open Publication Distribution System (**opds-spec.org**) and is more or less the same thing as an RSS feed, but specifically designed for digital libraries. OPDS feeds provide the metadata of many different books in a simpler, more compact format than web pages, and they are even usable on devices that do not have a web browser.

The majority of ereaders with Wi-Fi or similar interfaces can automatically discover these OPDS feeds in their local network, or fetch them from the internet in order to present their users with one list of all the titles that may be downloaded.

blocked by corporate firewalls. Above all, on non-encrypted connections, you would only be able to control accesses through the basic username/password feature of calibre-server.

Scenario number three provides access to Calibre from the standard web port, but controlled (and logged!) with all the flexibility, security and authentication support of a real web server. To make this happen, you'll need to set up calibre-server on a non-standard port, for example 8000, and then tell the web server to act as a reverse proxy for that port. The exact configuration options to use for the Apache web server are listed with all details at **tinyurl.com/862mwm6**, so we will only explain their general meaning here.

Reverse proxy simply means that when you tell your browser to load the page at **www.example.com/mybooks**, that request is received by Apache on port 80 and passed as-is to calibre-server on port 8000. Whatever output is produced in response on port 8000 is then passed as-is to your browser. Methods two and three will work only if the calibre-home folder on your server is an exact copy of the one on your desktop. Therefore, you should also set up a Cron job on your desktop that keeps the two folders always in sync, something like:

```
rsync -rvt --delete $HOME/.
calibre/ username@servername:/
path/to/calibre-home/
```

CALIBRE SERVERS... WITHOUT CALIBRE

On to the final method. Without Calibre, Calibre ebook servers make the content of a Calibre library available online as web pages or OPDS feeds. You can obtain the same results with programs like Calibre2OPDS (**calibre2opds.com/**) or COPS (**blog.slucas.fr/en/oss/calibre-opds-php-server**) which generate HTML and/or OPDS catalogues with more features than the ones created by Calibre. Unlike the original program, Calibre2OPDS produces static web pages and OPDS feeds. Therefore, its catalogues will work on any hosting account, including those that don't support PHP.

QUICK TIP
Legalities of sharing

Calibre catalogues that are viewable online will be useful for families and organisations. Make sure you only share ebooks that are in the public domain.

The main advantage of Calibre2OPDS, however, is the number of ways in which you may customise its catalogues. During the initial configuration you may set – among other things – the exact number and combination of ebook formats to provide, the number of levels in each view of the catalogue and the thumbnail size.

You can also tell Calibre2OPDS to add to each title links to the relevant pages in Wikipedia, Amazon, Goodread, ISFDB and Librarything. A detailed comparison of the catalogues generated by calibre-server and Calibre2OPDS is available online at **calibre2opds.com/about/calibre2opds-vs-calibre-catalogs**.

Calibre2OPDS is a Java application, which you should never launch directly. The Linux package contains two shell wrappers called rungui.sh and run.sh, that launch the main program in GUI or command line mode respectively.

The graphic interface isn't hard to use, as long as you are aware of a few things. Firstly, click the big icon of a file server case to put the program in Publish mode. This is the only mode that lets you create your catalogue in a destination folder, which will contain all the ebooks and their covers outside the Calibre folder (called 'database folder'). Next, go to 'Profiles › New profile' and give a meaningful name to the usage profile that you are about to create. Choose a proper location for your destination folder and a suitable name and title for the catalogue web pages. Finally, click Save to save all options in the new profile, and 'Generate Catalogues' to create them.

The first time you run it, Calibre2OPDS will want to erase everything it finds in the destination folder. Future runs will only update what is already there, but for your peace of mind – as well as easier system administration – create a new, empty folder just for this purpose!

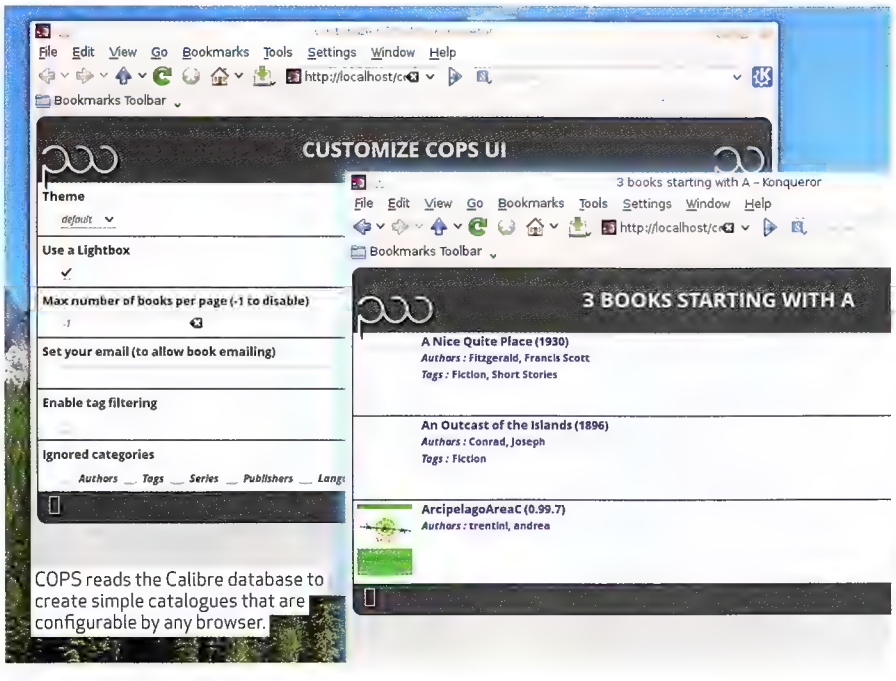
In practice, we'd suggest using the GUI only for the initial configuration, and then set up a Cron job that calls run.sh to regenerate the static catalogue(s) on your computer and calls rsync to copy them on to your server.

As flexible as they are when it comes to configuration, the catalogues created by Calibre2OPDS lack a search function because they are static pages. Calibre-server has a Generate Search Index function, but it is still at the experimental stage. These issues led to the development of COPS, which is a set of PHP pages able to query the Calibre database. The result is a clean-looking catalogue with a simple search box.

To make COPS work you must simply unpack the Zip archive found on the home page in the right folder of your web server and make a copy of the file config_local.php. Then open that file and change the values of these two variables as necessary:

```
$config['calibre_directory']
= './calibrecopy/';
$config['cops_title_default']
= "COPS for LinuxFormat";
```

calibre_directory is the path to the full copy on the server of your local Calibre data folder. Remember to add a trailing slash to it, or COPS won't work. As in the calibre-server cases, you will need to set up a Cron job that keeps that folder always in sync with the one on your desktop.


File Edit View Go Bookmarks Tools Settings Window Help
Bookmarks Toolbar
CUSTOMIZE COPS UI
Theme
default
Use a Lightbox
Max number of books per page (-1 to disable)
Set your email (to allow book emailing)
Enable tag filtering
Ignored categories
Authors Tags Series Publishers Langs
3 books starting with A – Konqueror
3 BOOKS STARTING WITH A
A Nice Quite Place (1930)
Authors : Fitzgerald, Francis Scott
Tags : Fiction, Short Stories
An Outcast of the Islands (1896)
Authors : Conrad, Joseph
Tags : Fiction
ArcipelagoAreaC (0.99.7)
Authors : trentini, andrea
COPS reads the Calibre database to create simple catalogues that are configurable by any browser.

Going retro

Retro's not just for fashion, it's for games too. Nathan Taylor shows you how to create your own retro gaming PC for cheap and turn it into your favourite console (or computer of yesteryear) using emulation.

There's nothing quite like a nostalgia trip. Playing the Commodore 64 version of *Boulder Dash* or *Final Fantasy III* on Super Nintendo can make you feel like a kid all over again.

Of course, you probably don't have your old console and computer hardware anymore, but you can replicate the experience – on your big screen flat screen no less – using an emulator. Just about every retro platform has an emulator or ten available for it, from major platforms like the Commodore 64 and Amiga to obscure (globally speaking) platforms like the MicroBee and Tandy TRS-80.

The best part is that you can set all this up using hardware you probably already have. An old laptop or outdated desktop PC will do the trick. You don't need a powerhouse home theatre PC to get it up and running.

GETTING THE RIGHT HARDWARE

CPU AND VIDEO

You can make an emulation platform out of just about any piece of computing hardware. Unless you plan to emulate relatively recent platforms like the PlayStation 2, most emulation platforms have only modest requirements. A 1GHz processor and 1GB of RAM will do the trick for most tasks, and you can even get away with much less for older platforms.

The key requirement of any platform is the capacity to plug it into your TV. Recent computing devices will have an HDMI output or a DVI output (which can be converted to HDMI with a simple $5 converter cable), but if your computer has only VGA output and you don't have VGA-in on your TV you will need a VGA to HDMI converter, which is typically a dongle that sells for about $40-$60.

THE CONTROLLER

For the game controller, you can use any PC game controller and it will generally work. Your best option, however, is the Xbox 360 controller, which is roughly 1,000% better than most of its competitors. You can just plug the wired controller straight in. If it's the wireless version of the controller, you'll need the Xbox 360 Wireless Gaming Receiver, which will cost you about $20, but you'll need to hunt around on eBay as Microsoft doesn't sell these locally any more. (We've had luck with knock-off versions, but these do require you to jump through a couple of small hoops to get the drivers installed.)

Keyboard and mouse control is tricker. For PC emulation you'll need it, and many console emulators need to be at least launched with a keyboard and mouse, even if they support gamepad control thereafter. Your best bet is a wireless keyboard with integrated touch pad like the Logitech Wireless Touch Keyboard or NOONTEC Rii I8.

THE SOFTWARE PLATFORM

While Windows still offers the widest variety of emulator applications, in practice you can do well on just about any platform. Linux, Mac OS and Android are very viable as underlying platforms for emulators.

One thing you will want to do is set up an easy way to launch the emulators without having to crack out the mouse and click on screen icons you can barely see from your couch. A "10-foot" interface lets you launch emulators and games without having to use a keyboard and mouse. There are a variety of good launcher apps available that provide this, but we'll focus on two we like best.

Steam (**store.steampowered.com**) is a very good option, since it has an excellent Big Picture mode that can be controlled entirely with a controller. While Steam doesn't offer emulators for download, you can add them to your

A keyboard with integrated trackpad saves you a lot of awkwardness in a lounge room environment.

An easy option: Ouya

If you don't mind spending a little bit of money there are a number of cheap hardware platforms very capable of running emulators. Our top pick is the US$99 Ouya console, an ARM Tegra 3-based device that conveniently comes with a controller and has easy-install emulators for every major platform (including computing platforms) in its game store.

Steam library by heading to the Library tab and clicking 'Add a Game'.

Another option we really like, and one that works smoother for emulators is GameEx, a front end for a variety of arcade and console emulators. It works really well in a TV environment, and while it can be a little complex to set up initially, it's totally worth it. It will even download emulators for you!

ALL ABOUT ROMS AND IMAGES

A software emulator is not enough to complete your task. You'll also need the actual software to run on the emulator. Generically called ROMs, these are images of the software released for the retro platforms, ripped and packaged into a PC friendly format. (As an aside, even disk images such as Amiga floppy disk images that are not technically read-only are referred to as ROMs on the internet). There are two types of ROMs you may need: system ROMs and game ROMs.

SYSTEM ROMS.

System ROMs are the core software used by the platform, the BIOS-equivalent and OS of the platform as it were. Most emulators you'll download don't need it or come with it built in, but for a handful of emulators like WinAUE or Mess you will need to get hold of the system ROMs.

GAME ROMS.

Of course, to actually play something on your emulator you'll need a copy of the game. With console emulation, cartridges and CDs are typically ripped into a single file. This makes them very easy to use: you just load the ROM file into the emulator. The emulator will then run the ROM just as if you'd plugged in the original cartridge.

Steam's Big Picture mode is built for loungerooms.

With computing platforms you have disk images, which work in practice a lot like ROMs. They're individual files that represent the contents of an entire disk (or tape). You load them into the emulator, and it acts as if they were a disk that you'd inserted into the drive (you can even write to them as if they were real disks).

WHERE DO I GET THEM?

The key question, of course, is how you get hold of system and game ROM images. There are three key sources you can look at:

LEGAL COLLECTIONS.

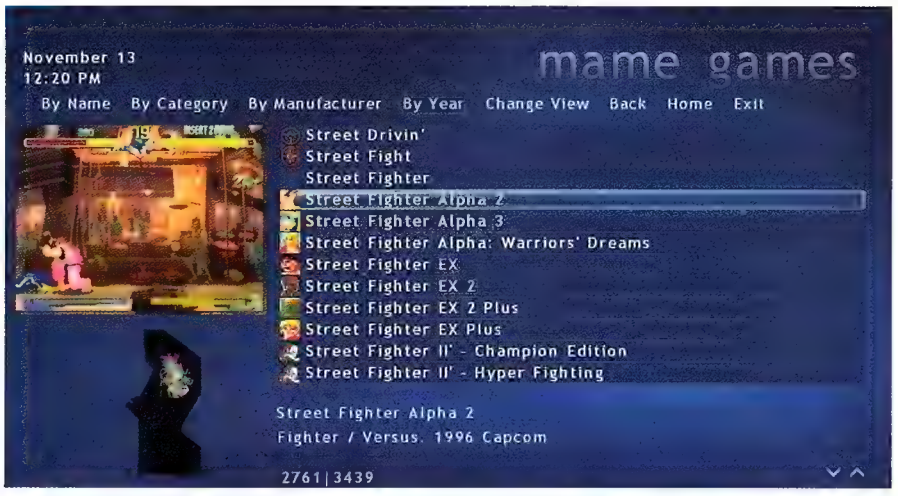
Although we wish otherwise, legal collections of licensed ROMs are few and far between. There have been a few abortive attempts at releasing collections, but there's not much available. Some abandonware sites (see below) claim to have acquired legal permission to distribute ROMs, but there's no real way to verify these claims. One special note, however, does go to Amiga Forever (**www.amigaforever.com**), which provides a full legal and licensed version of the Amiga system ROMs.

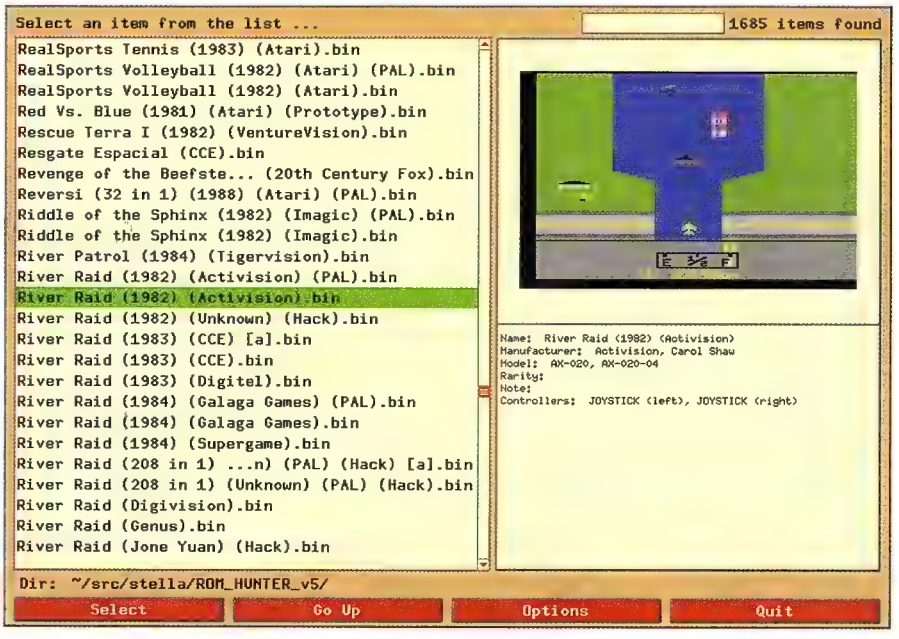
ABANDONWARE SITES.

Abandonware is a (non-legal) term used to describe content that is no longer available for sale and the maker is no longer profiting from it. There are many sites online that post abandonware – just Google it – most focussing on DOS and other PC platforms. Some of the most notable are Abandonia (**www.abandonia.com**, DOS), Back to the Roots (**www.back2roots.org**, Amiga), c64g (**c64g.com**, Commodore 64), Emu Paradise (**www.emuparadise.me**, multiple platforms) and CoolROM (**www.coolrom.com**).

BITTORRENT.

If you're looking for comprehensive collections, BitTorrent is unquestionably the way to go. Entire libraries of games and ROMs are posted


November 13
12:20 PM
mame games
By Name By Category By Manufacturer By Year Change View Back Home Exit
Street Drivin'
Street Fight
Street Fighter
Street Fighter Alpha 2
Street Fighter Alpha 3
Street Fighter Alpha: Warriors' Dreams
Street Fighter EX
Street Fighter EX 2
Street Fighter EX 2 Plus
Street Fighter EX Plus
Street Fighter II' - Champion Edition
Street Fighter II' - Hyper Fighting
Street Fighter Alpha 2
Fighter / Versus. 1996 Capcom
2761|3439


Select an item from the list ...
1685 items found
RealSports Tennis (1983) (Atari).bin
RealSports Volleyball (1982) (Atari) (PAL).bin
RealSports Volleyball (1982) (Atari).bin
Red Vs. Blue (1981) (Atari) (Prototype).bin
Rescue Terra I (1982) (VentureVision).bin
Resgate Espacial (CCE).bin
Revenge of the Beefste... (20th Century Fox).bin
Reversi (32 in 1) (1988) (Atari) (PAL).bin
Riddle of the Sphinx (1982) (Imagic) (PAL).bin
Riddle of the Sphinx (1982) (Imagic).bin
River Patrol (1984) (Tigervision).bin
River Raid (1982) (Activision) (PAL).bin
River Raid (1982) (Activision).bin
River Raid (1982) (Unknown) (Hack).bin
River Raid (1983) (CCE) [a].bin
River Raid (1983) (CCE).bin
River Raid (1983) (Digitel).bin
River Raid (1984) (Galaga Games) (PAL).bin
River Raid (1984) (Galaga Games).bin
River Raid (1984) (Supergame).bin
River Raid (208 in 1) ...n) (PAL) (Hack) [a].bin
River Raid (208 in 1) (Unknown) (PAL) (Hack).bin
River Raid (Digivision).bin
River Raid (Genus).bin
River Raid (Jone Yuan) (Hack).bin
Name: River Raid (1982) (Activision)
Manufacturer: Activision, Carol Shaw
Model: AX-020, AX-020-04
Rarity:
Note:
Controllers: JOYSTICK (left), JOYSTICK (right)
Dir: ~/src/stella/ROM_HUNTER_v5/
Select
Go Up
Options
Quit

to BitTorrent. The complete MAME collection, every SNES game ever released (and every version thereof), thousands of C64 or Atari 2600 games in one bundle. All these things and more are available, but you'll need to be willing to wander into some dark legal waters on sites like The Pirate Bay (**thepiratebay.se**) and Kick Ass Torrents (**kickass.to**) to get them.

THE EMULATORS

So you've set up your PC, hooked it up to your TV and have your controller in hand. Now you just need the software that turns your three-year old PC into a 30-year old console or home computer. Below are our favourite emulators for some of the most popular platforms. This list is far from comprehensive, but if you want a good selection to begin with, this is a good place to start. All the emulators listed here are free.

THE PLATFORMS

ARCADE

MAME

- mamedev.org
- Available on: All platforms. Seriously.

MAME is about 90% of the reason that people build emulation platforms. It's designed to run ROMs of arcade games – yes, those games you used to go out and pay 20c/40c/$1 a pop to play. It emulates literally thousands of arcade games and what's more it does it extremely well, very rarely crashing or having problems.

MAME is normally a command line tool, so you're best off using a front end loader, and there are some very good ones that remove the keyboard requirements completely. We like MaLa (**malafe.net**).

PC-LIKE PLATFORMS

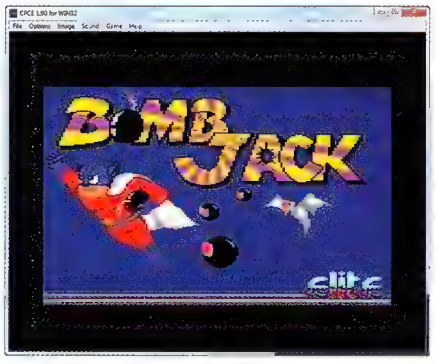
Computing platforms can be challenging to emulate. With varying specs, writable media and complex underlying systems, these emulators can be tricky to set up.

AMSTRAD CPC

CPCE

- **cpce.emuunlim.com**
- Available on: Windows

The Amstrad CPC, a contemporary of the Commodore 64, has a variety of



emulators available for it. Our current favourite is CPCE 1.9. It's simple to use and works with nearly everything.

APPLE II

APPLEWIN

- **applewin.berlios.de**
- Available on: Windows

Compared to some of the systems of a similar era, the state of Apple II emulation is quite poor. You can try AppleWin, however, which is somewhat bare but does a decent job of recreating the system.

COMMODORE 64

VICE

- **vice-emu.sourceforge.net**
- Available on: Windows, OS X, Linux and many more

There are a number of emulators available for the beloved Commodore 64 (and Vic 20/C128), but our current favourite is Vice, an open source emulator that has excellent compatibility and is relatively easy to use. If you're going to run Vice we also recommend getting hold of Gamebase 64 (**www.gamebase64.com**) a phenomenal front end and database of games for the C64.

COMMODORE AMIGA

WINUAE

- **www.winuae.net**
- Available on: Windows (other versions of UAE are available for other platforms)

The 16-bit Amigas were immensely popular computers, but they were also extremely complicated from a hardware perspective. WinUAE is the best implementation of a system to emulate all the Amiga's variations, and it comes with simple settings that allow you to emulate, say, a stock Amiga 500. You'll still need to source the Workbench disks (the Amiga's OS) and Kickstart ROMs (BIOS equivalent).

DOS/X86

DOSBOX

- **www.dosbox.com**
- Available on: Windows, Linux, OS X

Sometimes old DOS games don't run well in Windows. They run too fast, there's no sound, they don't look right.

That's where DOSBox comes in, which emulates a older x86 running DOS and a SoundBlaster card.

SCUMM

SCUMMVM

- **scummvm.org**
- Available on: Windows, Linux, OS X, Symbian, Android and more

What's that you say? You've never heard of a platform called Scumm. That's because there wasn't a PC by that name; it's actually the name of the game engine used by old LucasArts games like *Day of the Tentacle* and *Secret of Monkey Island* (among many others). ScummVM emulates that engine, allowing you to play those games on any of its many platforms. It has also been expanded to support play of many other games, including Sierra AGI/SCI games (*King's Quest, Space Quest* and many more), AdventureSoft games and Westwood games. It's quite brilliant, and a very easy way to play old favourites without worrying about specific platform emulation.

MULTIPLE SYSTEMS

MESS (MULTI EMULATOR SUPER SYSTEM)

- **www.mess.org**
- Available on: Many platforms.

MESS is the computer equivalent of MAME, built on the same engine but made to emulate a variety of different computing platforms. And that it does: MAME can accurately emulate dozens of different common and obscure computers. It's not generally as easy to use as a dedicated platform emulator, and you will need system ROMs for any platform you want to emulate.

CONSOLES

Compared to PCs, consoles are much simpler to emulate and the emulators are generally much easier to use. Most of the time, you just load the emulator, choose a ROM you want to play and go.

ATARI 2600

STELLA

- **stella.sourceforge.net**
- Available on: Many platforms, including Windows, OS X, mobile platforms and Linux.

Stella is the easiest, most accurate and most fun emulator for the old Atari 2600. It even has very cool features like an OpenGL mode that makes the 8-bit graphics appear a little less garish on modern screens.

NINTENDO 64

MUPEN64PLUS

- **code.google.com/p/mupen64plus/**
- Available on: Windows, OS X, Linux, Android

Nobody has quite nailed Nintendo 64 emulation yet, but mupen64plus comes close. It can accurately play most N64 games.

NINTENDO ENTERTAINMENT SYSTEM

NESTOPIA

- **nestopia.sourceforge.net**
- Available on: Windows, OS X, Linux

There are many NES emulators around, but we really like Nestopia – it's very easy to use, plays everything and scales well on a larger screen.

NINTENDO GAME BOY

VISUAL BOY ADVANCE

- **sourceforge.net/projects/vba/**
- Available on: Windows, OS X, GNU/Linux, Android and others

Whether it's the Game Boy, Game Boy Color, Game Boy Advance or Super Game Boy, Visual Boy Advance has you covered. It works extremely well, and it very simple to use.

PLAYSTATION 1

EPSXE

- **www.epsxe.com**
- Available on: Windows, Linux, Android

Emulation of the original PlayStation has reached the point where you can play most games for the platform very smoothly. ePSXe is your best bet for doing that, with an easy to use interface and cool features like image scaling.

PLAYSTATION 2

PCSX2

- **pcsx2.net**
- Available on: Windows, OS X, Linux

According to PCSX2's compatibility list, approximately 85% of all PS2 games are playable on the emulator, although if you're looking for a crisp "just like the real thing" platform you'll likely be disappointed. Some games work extremely well, but many meet the bare definition of "playable". It's a complicated emulator to set up and requires a hefty processor (2.8GHz and 2GB of memory is recommended).

SEGA GENESIS/MEGADRIVE, MASTER SYSTEM AND GAME GEAR

FUSION

- **tinyurl.com/n3vc64d**
- Available on: Windows, OS X, Linux

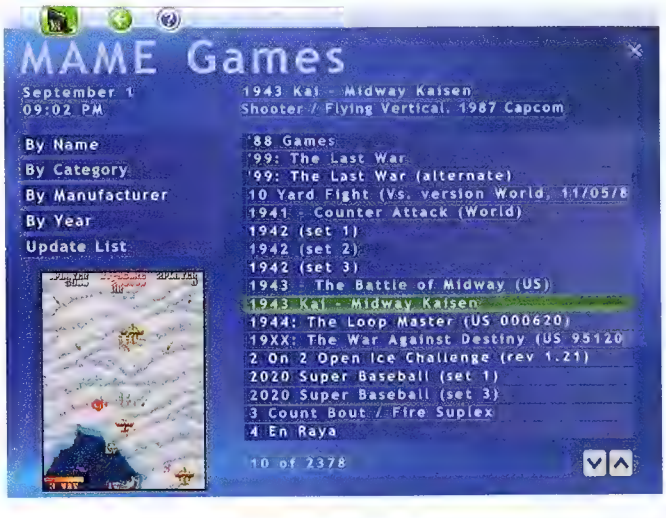
Like Super Nintedo, Sega Genesis emulation is very solid nowadays, with very accurate reproduction. Your best bet for the Sega Genesis is Fusion, which is easy to use and looks good. As a bonus, Fusion also emulates the Master System, Game Gear, 32X and SegaCD.

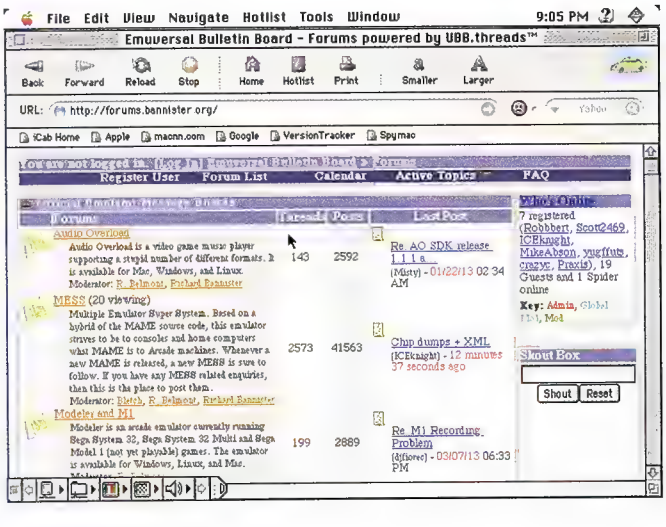
SUPER NINTENDO ENTERTAINMENT SYSTEM

SNES9X

- **snes9x.com**
- Available on: Windows, OS X, GNU/Linux, Android, iOS, many more.

When it comes to Super Nintendo emulation, nobody does it better than SNES9X, which will play just about any SNES ROM without any trouble or fuss.


MAME Games
September 1
09:02 PM
1943 Kai - Midway Kaisen
Shooter / Flying Vertical, 1987 Capcom
By Name
By Category
By Manufacturer
By Year
Update List
'88 Games
'99: The Last War
'99: The Last War (alternate)
10 Yard Fight (vs. version World, 11/05/8
1941 - Counter Attack (World)
1942 (set 1)
1942 (set 2)
1942 (set 3)
1943 - The Battle of Midway (US)
1943 Kai - Midway Kaisen
1944: The Loop Master (US 000620)
19XX: The War Against Destiny (US 95120
2 On 2 Open Ice Challenge (rev 1.21)
2020 Super Baseball (set 1)
2020 Super Baseball (set 3)
3 Count Bout / Fire Suplex
4 En Raya
10 of 2378


File Edit View Navigate Hotlist Tools Window
9:05 PM
Emuuersal Bulletin Board - Forums powered by UBB.threads™
Back Forward Reload Stop Home Hotlist Print Smaller Larger
URL: http://forums.bannister.org/
Register User Forum List Calendar Active Topics FAQ
Who's Online
Shout Box
Shout Reset

Host your own cloud server

Build your own cloud server for security and convenience. Neil Mohr explains how to take control of your files.

STAY SECURE

When accessing your ownCloud files over the public internet, remember to use a long, secure password, protect any mobile devices with a PIN and disable the service when not needed.

Build your own castle in the sky and snuggle all of your data into one cosy place. The promise of cloud storage on the internet has, to a large extent, been delivered. We've got free services of all shapes and sizes, but is this a dream come true or the start of a nightmare?

We're leaning towards the latter, as it certainly offers an easy way for the government to rifle through your stuff for no good reason and share its findings with all of its buddy services. Of course, that's without any consent or knowledge from you, because we're all happy with that, right? Players of the *APC* drinking game should take a dram now, because we're ranting about the NSA and its mates.

But building your own cloud storage is a hard, costly and tiresome endeavour, right? Wrong. An awfully clever group of people have built a system called ownCloud, a web service that's designed to run on most web servers with PHP and SQL. If all that tech jargon has overloaded your brain, don't panic. Getting ownCloud installed does require Linux and a little console action, but once it's up and running, this is a largely web-interface affair. We're also going to hold your hand as much as possible to get you past the scary parts.

WAY OF THE LINUX

You may very well be screaming: "Why do we need to run this on Linux and not Windows?" It's an understandable lament, but the reality is that a near-default install of a Linux server comes with a pile of useful web-based tools, protocols and services. The ownCloud project uses standard web server, PHP and MySQL services to offer you an easy to use cloud system, and without Linux it'd be next to impossible or just very expensive to have it developed.

In the walkthrough (during the Ubuntu install process in particular), there are options for LAMP and OpenSSH servers. LAMP is short for Linux, Apache, MySQL and PHP. The Linux aspect should be self-evident, Apache is the most famous open source web server. MySQL is the famous open source SQL database implementation, and PHP is the best known web-based programming language. That lot make for a formidable server install.

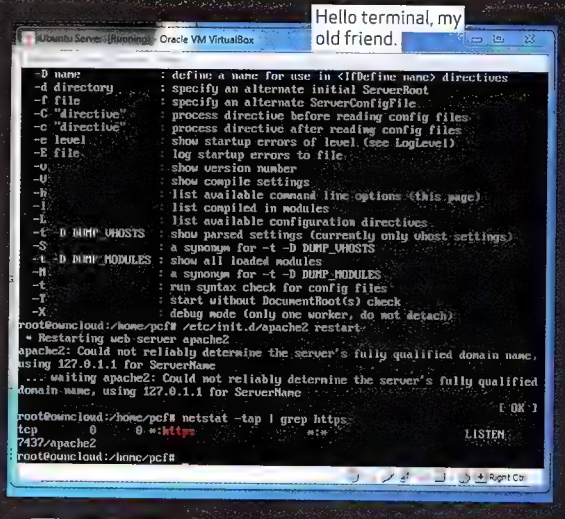
> "But building your own cloud storage is a hard, costly and tiresome endeavour, right? Wrong."

Install ownCloud

We're covering installing ownCloud here, as it involves some longer command line entries. At this stage you should be logged into the VM at a Linux command prompt. For reference, the IP address of the Apache web server is listed. Enter it into a web browser to check it's working. Now we need to add PHP5 and Curl libraries, then download and extract the ownCloud system:

```
Sudo su
apt-get install php5 php5-gd
php-xml-parser php5-intl
php5-sqlite php5-mysql
smbclient curl libcurl3 php5-
curl mysql-server
wget http://download.
owncloud.org/community/
owncloud-5.0.11.tar.bz2
tar xjf owncloud-5.0.11.tar.
bz2
mv owncloud/ /var/www/
owncloud
```

Next, we need to make a Data folder and set read/write permissions:


Hello terminal, my old friend.
Ubuntu Server [Running] - Oracle VM VirtualBox
-D name : define a name for use in <IfDefine name> directives
-d directory : specify an alternate initial ServerRoot
-f file : specify an alternate ServerConfigFile
-C "directive" : process directive before reading config files
-c "directive" : process directive after reading config files
-e level : show startup errors of level (see LogLevel)
-E file : log startup errors to file
-v : show version number
-V : show compile settings
-h : list available command line options (this page)
-l : list compiled in modules
-L : list available configuration directives
-t -D DUMP_VHOSTS : show parsed settings (currently only vhost settings)
-S : a synonym for -t -D DUMP_VHOSTS
-t -D DUMP_MODULES : show all loaded modules
-M : a synonym for -t -D DUMP_MODULES
-t : run syntax check for config files
-T : start without DocumentRoot(s) check
-X : debug mode (only one worker, do not detach)
root@owncloud:/home/pcf# /etc/init.d/apache2 restart
* Restarting web server apache2
apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1 for ServerName
... waiting apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1 for ServerName
[OK]
root@owncloud:/home/pcf# netstat -tap | grep https
tcp 0 0 *:https LISTEN
7437/apache2
root@owncloud:/home/pcf#

```
mkdir data
chown -R www-data:www-data
data
chown -R www-data:www-data
config
chown -R www-data:www-data
apps
```

OwnCloud is almost ready to go. Pick things up in the main walkthrough.

Jargon buster

SSL

Secure Socket Layer. It works over port 443 and offers solid encryption from everyone except the NSA.

APACHE

A widely used web server implementation deployed with many versions of Linux.

PHP

A server-side, web page-stored programming language that's free to use.

Trying, trying Linux

OwnCloud takes some setting up, but it's well worth the effort. Beyond providing you total control over what's shared and who has access to it, ownCloud provides powerful features such as multi-folder sharing.

We've tried to keep things simple, so we've skipped a number of areas. One of these is the addition of extra storage space. This is certainly possible and very flexible, and you can assign physical, networked and cloud-based storage over various protocols and services. Unfortunately, storage can only be added by editing config files (see the ownCloud manual). A big reason for not covering this is that it deals with the insanity of Linux storage mounts, which would require a full tutorial in itself.

It's also worth extending the HTTPS security. We advise installing **http://webmin.com** browser-based server front-end and configuring virtual servers to forward standard HTTP calls to the HTTPS port. This would ensure that all your transfers and calls are encrypted. We've set up basic HTTPS access, but this would ensure everything is encrypted. If you don't like the certificate warnings, it is possible to sign your own, too.

We also overlooked the plug-in system. These are known as apps and are listed under the Settings menu. One of our favourites is WebDAV, which provides Explorer-like browsing of files over a HTTP connection. If this seems far too complex, take a look at **www.tonido.com**. This service offers a free 2GB option, or an annual $30 100GB subscription.

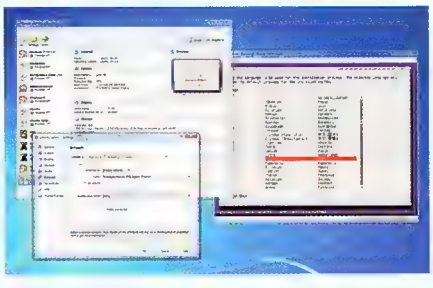
Add to that OpenSSH and you're able to remotely access and control the server over a secure terminal. This last point is a little moot, as we're running this on a virtual machine via VirtualBox, but following this you could deploy it on real hardware, in which case you'd use a SSH client like PuTTY to securely log in to the server.

To make this less scary, we're going to run it all wrapped up in a virtual machine. As usual, we're using VirtualBox from Oracle. If you haven't already, download and install it (**www.virtualbox.org**).

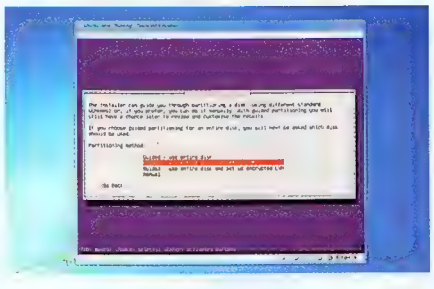
For the Ubuntu server, create a new machine with at least 1GB of memory and add storage of say 100GB for the primary hard drive. You'll need to point the CD optical drive to the Ubuntu Server ISO image you downloaded. We also suggest for the virtual machine that under Network you select a bridged connection, as

Basic bits

Let's get the configuring configured.



1 BOXING CLEVER
Install VirtualBox, choose to create a new virtual machine and give it 1GB. If you're running 4GB or more of the real stuff, ensure you point the optical drive under Storage to the downloaded Ubuntu ISO. In the Networked section, we suggest changing 'Attached to' to 'Bridged adapter'. This ensures the virtual machine gets its own IP address.

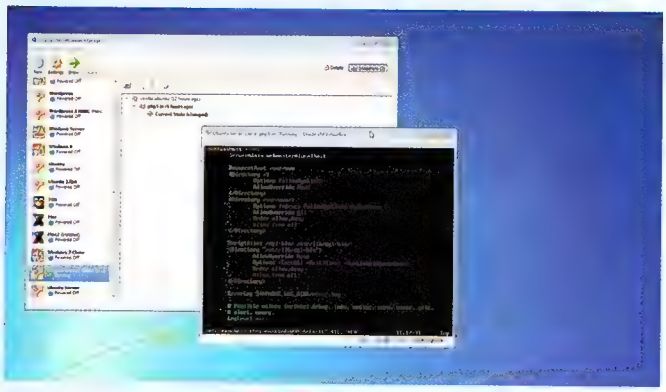


2 UBUNTU SERVER
When the VM starts it'll boot the CD ISO and start the installation. You need to create a new root user account. At 'Partition disks', select Guided and set up LVM. Remove anything already there and choose to use all but 4GB of the available space. This creates a large work partition and a small swap partition just in case. We'll look at adding more later on.

3 SET AND GO
Don't worry about HTTP proxy, select security updates and at Software selection ensure you select OpenSSH server and LAMP server. You'll be asked for a new MySQL password, we suggest you use one different to your main user account, but don't forget it! Install the GRUB boot loader and follow the guide on the left to install ownCloud itself.

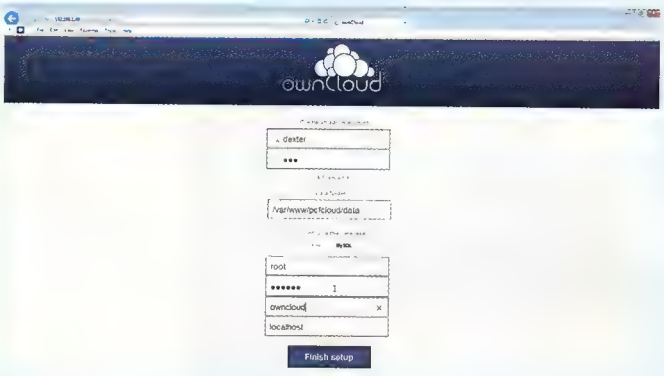
Sharing with ownCloud

Configure users and files for easy access to the cloud.



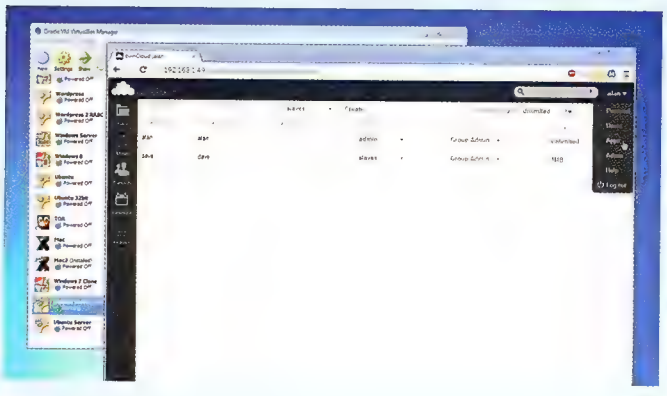
1 THE FINAL BITS

At the terminal type `sudo vi /etc/apache2/sites-enabled/000-default` — this is the crazy terminal text editor. Press I to edit and under the <Directory /var/www/> section, and set AllowOverride to All. You'll need to press Esc to end editing, then press W to write the file and Q to quit. Two useful commands are `sudo a2enmod rewrite` and `sudo a2enmod headers`.



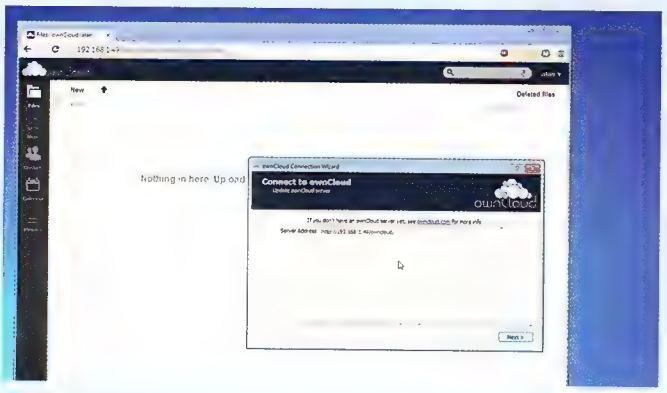
2 ALMOST THERE

Lastly type `service apache2 restart` to make the web server changes live. At this point you can finish the installation by typing `http://<vm.ip.address>/owncloud` into a browser. The ownCloud page will appear. Use any username and password and click Advanced. Enter root as the SQL username, along with the password you chose and a database name such as owncloud.



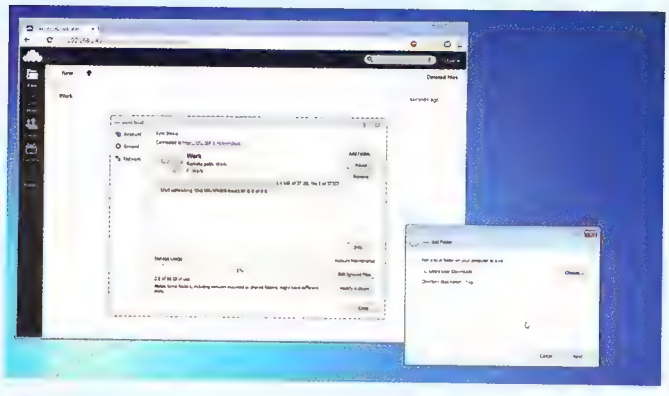
3 INSIDE OWNCLOUD

You're now looking at the main (and rather empty) browser interface. You'll see the Settings section is at the top-right of the screen. It contains a number of useful options, so select it and then click Users. This enables you to add, remove and control account access to the cloud system. Just type a name and password, add a group and give it a suitable quota.



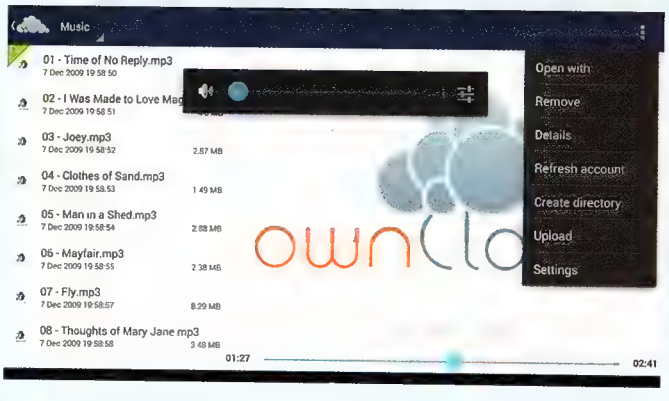
4 DESKTOP SYNC

OwnCloud enables you to synchronise a bunch of stuff with a desktop PC, Mac and Linux systems, including documents, photos, contacts and calendars. To get started, install the desktop tool from **owncloud.org/sync-clients**. To log in, type `http://<vm.server.ip>/owncloud` then supply the username and password. The tool will minimise to your notification area.



5 FOLDER SYNC

The primary use of the desktop app is to sync folders and files to the ownCloud server. You can choose as many folders and files as you like — you'll just need to create unique alias names on the server side and let them synchronise. Remember to add some MP3s to enable the music player, and do the same for pictures.



6 MOBILE CLOUD

OwnCloud has mobile apps for both Android and iOS. They're not perfect, as they seem to synchronise the entire folder tree, which can take a while if you have a lot of files. Otherwise this makes it easy to upload and download files from your ownCloud server. The alternative is to just use the browser interface, which isn't bad at all.

this provides the VM with its own real IP address, making accessing it rather more straightforward.

HAVE A GOOD TWEAK

Depending on the machine VirtualBox is running on, you'll want to adjust the VM settings to fit. We suggest 1GB of memory, but it'll be happy with 512MB. Tweak the processor settings, too – it's always handy to offer dual-core if available, but throttle the speed below 100%. We'll talk about adding storage at the end and partitioning Ubuntu as part of the walkthrough.

As with all things Linux, once you've hidden the underlying OS away, ownCloud is an easy-to-use system. If you pop over to **owncloud.org/install**, you'll find three different ways to install ownCloud. A download archive of the package, a web-based install file and dedicated Linux packages for the most common Linux distros. There's even a version for Windows Server, too.

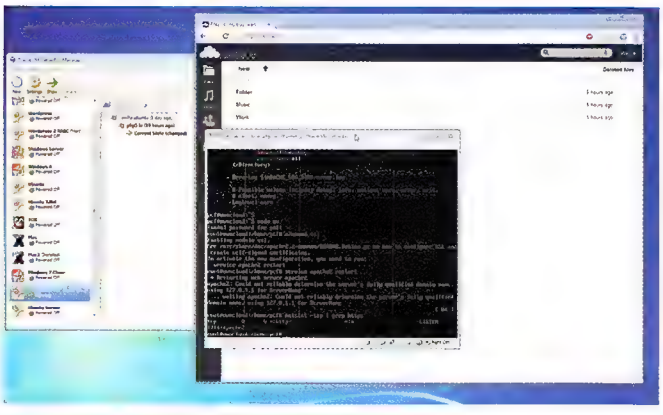
We're opting for the download archive in this instance. This is based on version 5.0.11, so it's worth checking to see if this has been updated. We'll reiterate the point made to the left and advise you to not use Internet Explorer. This entirely broke ownCloud and it took us all day to realise that even if the install was correct, it still won't work under IE. We'll also reiterate that if you do run this over the internet, we recommend using strong passwords.

DON'T USE IE

It's supposed to, but ownCloud 5.0 doesn't work with Internet Explorer. It would have been nice for someone to have mentioned this before we started...

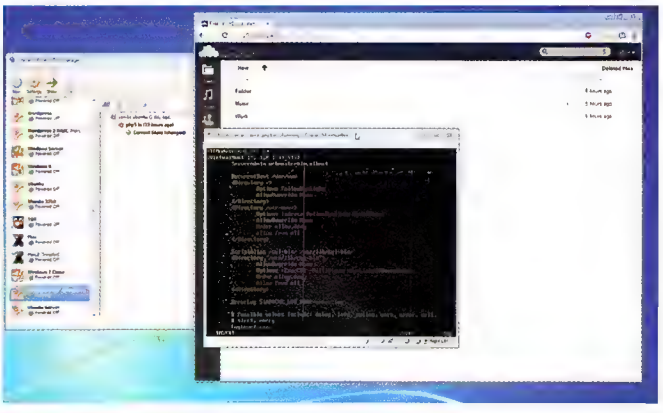
Keep it secret, keep it safe

It's possible to enable encrypted access with a bit of Linux trickery.



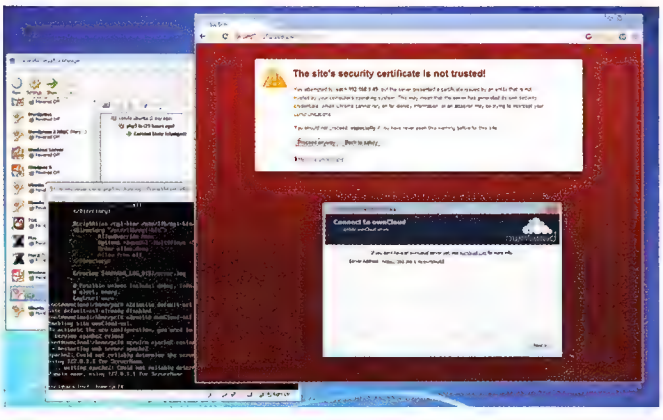
1 GAIN SSL SECURITY

To secure access with encryption, you should enable HTTPS access. Back at the console, type the following commands to enable SSL on the Apache server: `sudo su`, then `a2enmod ssl`, and finally `service apache2 restart`. You can then check that the changes are working correctly by typing `netstat -tap | grep https` and make sure the result is set to HTTPS LISTEN.



2 ENABLE HTTPS ACCESS

This command copies the default config and launches the terminal editor: `cp /etc/apache2/sites-available/default-ssl/etc/apache2/sites-available/ownCloud-ssl` then `vi /etc/apache2/sites-available/ownCloud-ssl`. Press I to edit and change the top <VirtualHost xxx:443> line's xxx to your server's IP address. Press Esc to finish.



3 FINISH UP

Press W to save and Q to quit. Finally we have three more commands to make the ownCloud host as the default instance: `a2dissite default-ssl` then `a2ensite ownCloud-ssl`, and finally `service apache2 reload`. You're now able to log on with the client using `https://<vm.ip.address>/owncloud` for an encrypted connection. You'll get a certificate warning, which is a standard thing.

4 ROUTE EXTERNAL CONNECTIONS

External connections rely on your router to forward the correct ports. You should select a random port between 49152 and 65535 — say 57001, for example. Set the router to forward port 57001 to port 443 at your VM's local network IP address. You can then connect externally to your home broadband's IP like this: `https://<broadband.ip>:57001/owncloud`.

Make an iTunes streaming music server

An iTunes server lets you put all your music in one spot for easy management, then stream it everywhere. Neil Mohr explains how.

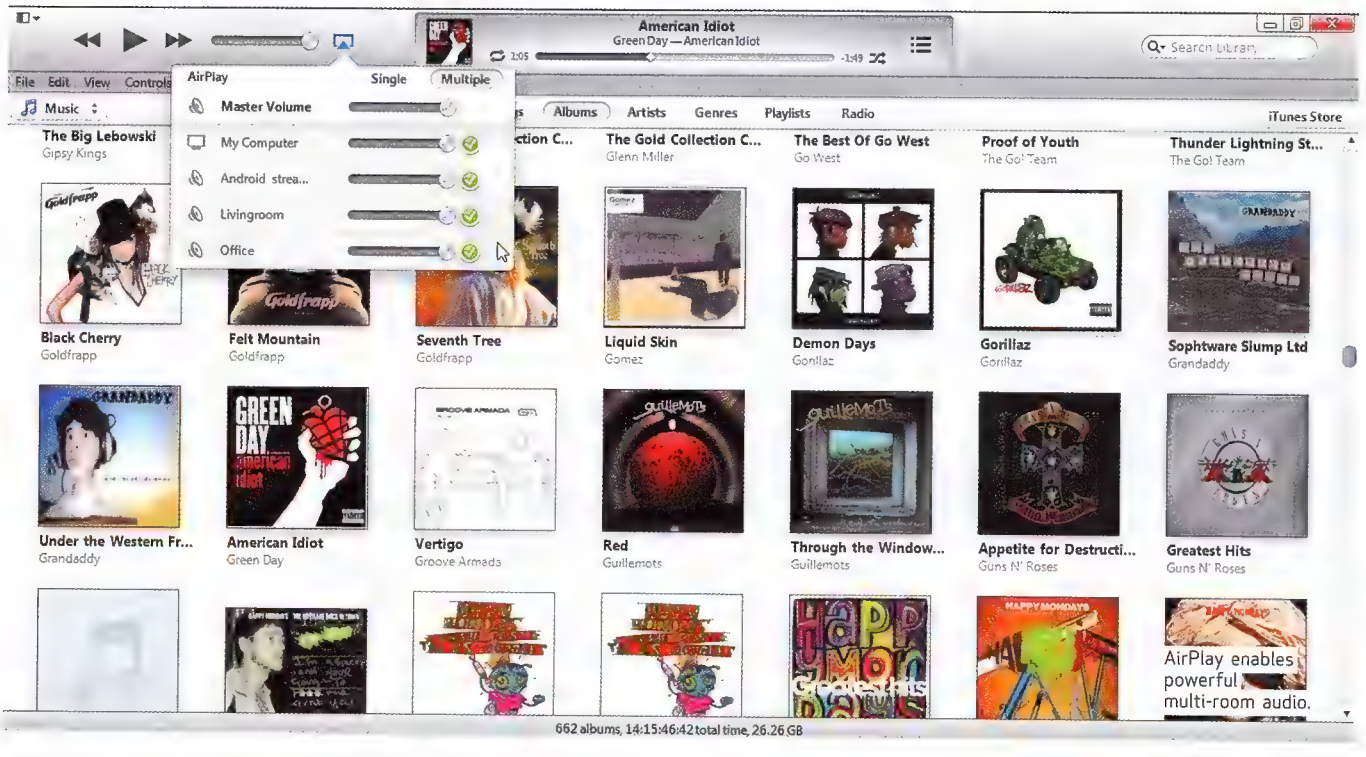
Another great use for an old PC or laptop is as a household streaming server for music – it's an easy way to create a central hub for all those disparate music files and can even help other family members discover (or perhaps rediscover) new music.

SERVING THE GOODS

The big question hanging over us is which program we'll use to dish out our audio. We're going to enrage a good section of the population by saying Apple iTunes, but stick with us – we have our reasons.

We don't much like iTunes. It's clunky, it's slow, it's updated too often, its store is pushed rather aggressively and it's bloated. However, it also has AirPlay – a fantastic multi-room streaming protocol that's widely supported, and which we can use to our advantage. Besides that, it has a flexible remote control system, it enables multi-user access to a shared library, it supports multiple streams, and it's perfectly possible to set it up and then never touch it again. It's also a decent media manager, and frankly it's possible to have multiple media managers working side-by-side. So bite the bullet, head to the dark side at **www.apple.com/itunes**, download it and install it on your server, no complaints please.

The important thing with iTunes is



PC formats

With so many to choose from, which is best?

We can split formats into two camps: lossy and lossless. Can you guess the advantage of lossless? The major lossless formats are WAV, AIFF, FLAC, ALAC and WMA, although there are others. WAV is the old-school PCM bit-stream audio format. It doesn't support tags and the files are huge. ALAC is Apple's lossless format and is widely supported, while FLAC is very similar, but it's open source and produces smaller files, making it our preference. WMA lossless is a good standard built into Windows Media Player, but isn't widely supported. FLAC supports better-than-CD quality via 24- and 32-bit eight-channel audio at up to 655kHz.

Lossy formats include MP3, MP4/AAC, Ogg and WMA. MP3 is good for CD audio in that it supports two-channel audio at 16 bits and up to 48kHz. MP4/AAC audio provides DVD audio quality with a better encoding scheme, so it should be your default format choice. It enables you to read better audio quality at the same bitrate. Ogg is an open source lossy format, but as much as we'd like to recommend it, you'd be better off sticking with the MP3 LAME encoder. On a quantitative level this gives the same results as Ogg and is more widely supported, but AAC outperforms both. WMA Pro matches AAC for quality, but again is less widely supported.

For file sizes, a WAV/AIFF CD rip would be 600MB, FLAC would be around 300MB, a 320kbps lossy format should be 150MB, and at 192kHz around 60MB. Annoyingly, iTunes doesn't support FLAC. Instead it uses Apple's proprietary ALAC format, which is very similar, but locks you to Apple players.

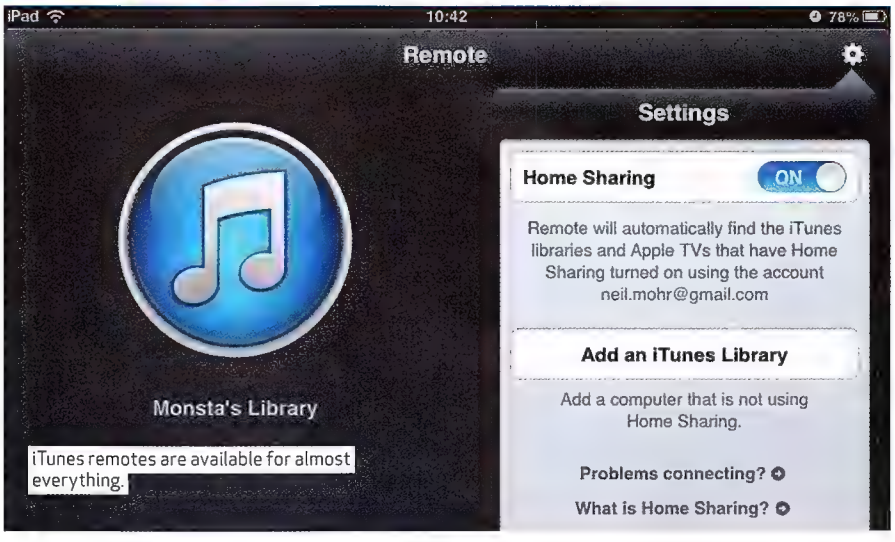
not to give it any real power. Open its diminutive new top-left menu, select 'Preferences > Advanced' and clear 'Keep iTunes Media folder organised'. If you then want to use other media mangers, streamers and so on, you can do so easily. We're assuming that you want to organise your music yourself – if not, you can ignore this step.

SHARE AND SHARE

Before driving onwards, you need to share this newly installed iTunes music library. It's best to enable the Apple Home Sharing system first. It's one of the beautiful zero-click things Apple does so well, in that devices will just find each other and work without any prompting. Open the menu and select 'Library > Turn on home sharing'. You will need an Apple ID for this, and you'll need to log in to activate it, but if this sounds hideous, it's possible to get by with PIN codes.

To start sharing, select the menu icon, then click 'Preferences > Sharing' and tick 'Share my library on my local network'. To simplify people's options, select 'Share selected playlists >

"It's one of the beautiful zero-click things Apple does so well, in that devices will just find each other and work without any prompting."


iPad
10:42
78%
Remote
Settings
Home Sharing
ON
Remote will automatically find the iTunes libraries and Apple TVs that have Home Sharing turned on using the account neil.mohr@gmail.com
Add an iTunes Library
Add a computer that is not using Home Sharing.
Problems connecting?
What is Home Sharing?
Monsta's Library
iTunes remotes are available for almost everything.

Platform games

They don't all play nicely together, but they're improving.

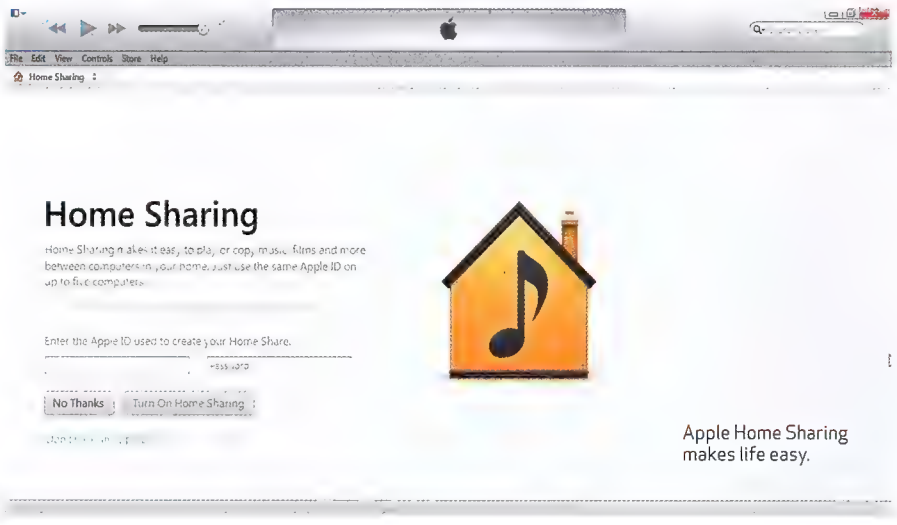
Being PC-centric is fantastic because we're usually lording it over everyone else technologically, but new smart-platforms with embedded cloud syncing and zero-click hardware integration are starting to offer hassle-free features across a range of cool products. Apple is a master of this, having started with its iPod and extended its ecosystem across a range of high-tech phones and tablets. Your iPhone, iPad and Apple TV combine with AirPlay for a seamless shared audio and video experience throughout your home.

Microsoft has learned from this. With Windows Phone 8, Windows 8, Windows RT and Xbox, you can share movies and music between devices and to your TV with minimal hassle.

Google offers Google Music and Films, enabling you to share music, TV and movies across devices via a streamed internet connection. Media can be cached locally, but even with Android it doesn't offer remote options or easy ways to get it on other devices. For multi-room audio you'll have to fall back to AirPlay.

Linux is bringing up the rear, as usual. We're still waiting for Ubuntu to release a consumer version of its smartphone OS, Ubuntu Touch and a tablet version will be even later. It's not entirely clear how this would all stick together. We're going to assume XBMC will offer its usual media capabilities, which could be a slick system when Ubuntu Touch eventually appears.

A single platform will be easier to use than any custom solution, but there's a penalty of expense and flexibility, not to mention perhaps abandoning the hardware you currently have. Realistically, there always seems to be another route via a third-party app or additional server software to enable you to tap into or work with proprietary services.


File Edit View Controls Store Help
Home Sharing
Home Sharing
Home Sharing makes it easy to play or copy music, films and more between computers in your home. Just use the same Apple ID on up to five computers.
Enter the Apple ID used to create your Home Share.
No Thanks
Turn On Home Sharing

Apple Home Sharing makes life easy.

Music'. Now click 'OK' and you're good to go.

Sharing to different types of systems and devices is, well, different. On a desktop or laptop PC or Mac, using iTunes is a breeze. Just open the pull-down menu that offers the local music, films and so on, and at the bottom there will be a new option under Home Shares. On Apple iOS devices, open the standard Music app, select 'More › Shared' and again choose the shared library. This gives you access to the entire music library as if it was stored locally.

Android devices can't access the iTunes library directly with any app we know of. If you already have Plex and are using its server and app, there's a Channel option that enables you to browse the iTunes library easily, but the app costs $5.50. Another Android option is the free TuneSync HomeStream server from **www.tunesynchomestream.com** and the associated free Android app. This ties in effortlessly with your existing iTunes library for shared streaming fun. The player itself needs a little work, but it's the best iTunes-based option we're aware of for Android.

REMOTE AIRPLAY

Once iTunes is encamped, with its hefty behind on your server, we can start doing some clever things. First on the cards is a little bit of remote control. This applies whether you're playing the audio directly from the server or streaming it to another box via your shared library. All the copies of iTunes running on a network computer can be remote-controlled. The only thing to remember is that the iTunes library on each system needs its own unique name, adjusted via the 'Preferences › General › Library name' setting.

For iOS devices, Apple offers its free Remote app. If you're using Home Sharing it'll automatically spot and list these devices in its list of available remote libraries. For devices not using Home Sharing you need to access the iTunes library list screen, tap the settings icon on the top right and select 'Add an iTunes library'. This provides a PIN and a new Remote icon, which will appear at the top right in the iTunes interface on your system running iTunes. Click this and enter the PIN to pair the devices.

Oddly, one thing that's poorly implemented is remote access from another computer. For Mac OS X users, there's **www.tuneconnect.net** – a well designed control tool that fits with the iTunes design. For PC users the choice is somewhat less impressive, but the excellent Tunesremote-SE from **tinyurl.com/mtjp89g** offers a full iTunes interface.

Android has a range of iTunes remote apps, many of which come with free and paid-for options. Our preference is Retune, from **tinyurl.com/mogpd4o**. It's free (though a donation is recommended), and offers a more fully-featured interface than many alternatives.

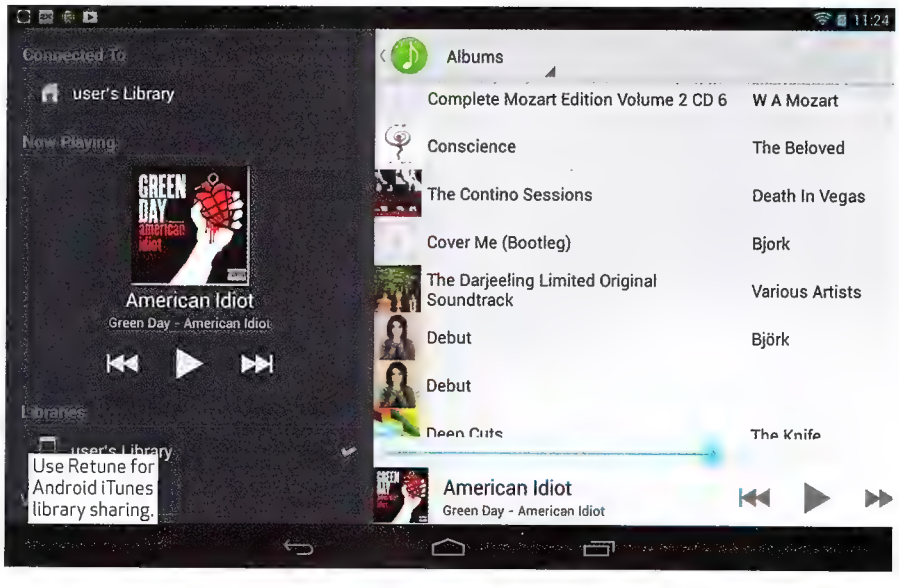
All these remote options offer support for the Apple remote speaker protocol AirPlay, which is one of the key reasons we're using iTunes. AirPlay is a networked speaker standard, so anything that supports it will appear in iTunes as a potential speaker output.

AirPlay stays hidden until an AirPlay device appears on the network. Add one and an icon appears next to the volume control in iTunes. Click this and a list of all available AirPlay devices appears. You have individual control over which devices output sound and at what volume, or you can have sound output from all of them.

Apple would like you to buy dedicated AirPlay speakers, which you can do, but one alternative that we like is to install AirBubble for Android from **tinyurl.com/n3amw33** and use the device as a AirPlay extender connected to a hi-fi or speakers. If you have older Android devices at home, this is a good use for the lazy green things.

For PCs, you can use the horribly named Shairport4w from **sourceforge.net/projects/shairport4w**. This is an open source project that turns any PC into an AirPlay target. It's just a 1.3MB executable, so can happily be left running on any system that could be used as a speaker output.

In Apple's usual idiotic way, iOS devices can't be made AirPlay targets, and it removes any apps that enable this, but if you own a jailbroken device we understand AirFloat will do the job. Finally we'll mention AirFoil from **www.rogueamoeba.com**, which costs $25. Installed on a Mac or Windows system, it enables you to direct the audio from any programs to almost any device, including AirPlay compatible speakers, Apple iOS devices and Android devices running its free app, so you can enjoy the delights of iPlayer or Spotify anywhere in your home.



News with a view _

TechRadar.com covers the stories you want to talk about _

So come along and talk. If you're passionate about technology, you'll find lots to keep you interested and plenty of ways to have your say.

techradar.
TECHNOLOGY. TESTED.

NOW LAUNCHED IN AUSTRALIA

VISIT **WWW.BIKERADAR.COM.AU** TODAY!

OLD GEAR: NEW TRICKS

PROJECTS FOR SMARTPHONES AND TABLETS

CONTENTS

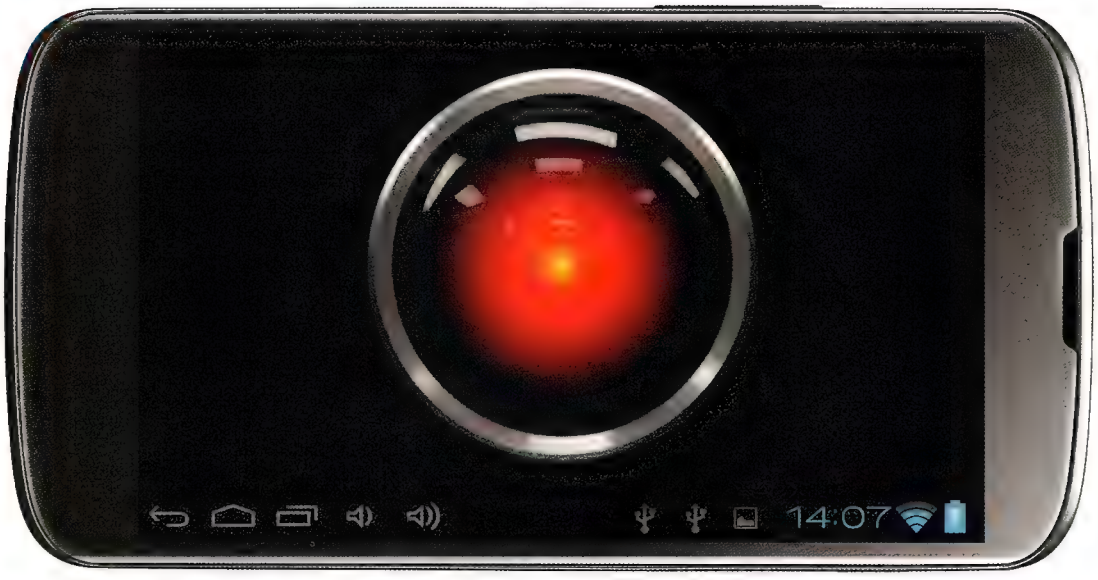
Turn an old Android into a networked camera 78
Use an old Android as a touchpad 80
Android-powered streaming music server 82
DIY Nvidia Shield 84

Smartphones and tablets may be relative newcomers to the personal computing revolution, but they've well and truly been around long enough for most of us (well, most *APC* readers at least) to have at least one or two older models lying around and gathering dust in desk drawers. But just like old PCs, these disused portables can be turned to more useful tasks with a little bit of effort.

After all, in many ways smartphones are just mini PCs – you might be surprised to learn that they're even flexible enough that they can be used for basic media server tasks (and creating your own Android-powered music streamer is something we've specifically covered over the following pages). While their limited processing power does mean there aren't quite as many jobs that an old smartphone or tablet is capable of, their compact size and more diverse hardware means that the tasks they can do are arguably more interesting. There are more utilitarian uses, like setting up an old Android as a streaming network camera, to the slightly more outlandish, as you'll find in our 'DIY Nvidia Shield' article, which explains how you can stream PC games to your smartphone or tablet and play them using a dedicated gamepad. (Wi-Fi bandwidth permitting.)

Of course, re-use isn't always the ideal option and if you're truly done with an old mobile – and can't give it to someone who might be able to still make use of it – you can always recycle it (check out **recyclingnearyou.com.au/phones/** for a list of recycling centres and other locations that'll take your old phones) or even sell it. There's a plethora of Australian businesses that'll buy an old handset off you, and it's easy to check the prices they all offer online – although you'll often get more if you're willing to go to the effort of selling it on eBay. (If you go with the former option, make sure the business you deal with has an ABN and operates out of Australia – as with all things online, this is another category that's ripe for scams.)

Of course, the variety of projects we've gathered together for this issue is hardly exhaustive, so if you've got other uses for an old phone, send us an email at **apcmag@futurenet.com** to share them with other APC readers!



Turn an old Android into a networked camera

If you have an old phone knocking about the place, it's easy to turn it into a wireless webcam.

Although wireless webcams aren't particularly that expensive anymore, using an old Android phone as one offers several benefits. In addition to doing everything you can with a regular webcam, it can double as a cheap security camera and stream video to PCs and your other Android devices when you're away from home.

There are several webcam apps available in the Play Store but the IP Webcam app is easy to set up and has several options to optimise the video stream according to the available bandwidth. The app also offers a choice of viewers with which to watch the stream.

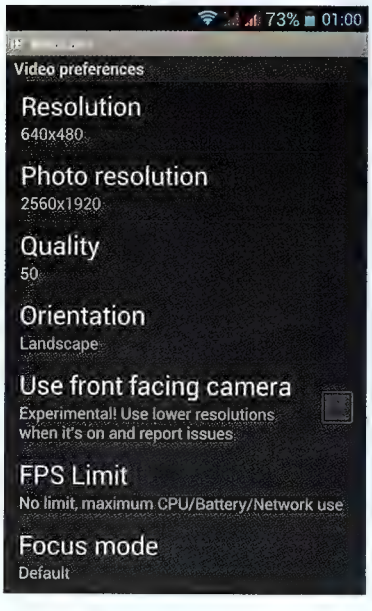
Because it can also capture audio, you can use the app to turn your phone into a nifty little surveillance monitor to keep an eye on your baby in the next room. If you tweak your firewall, you can also view the stream from outside your network. This is useful for keeping an eye on your front door while you are away. And you can even call your webcam if you want to talk to the person at the door.

Turn your phone into a webcam

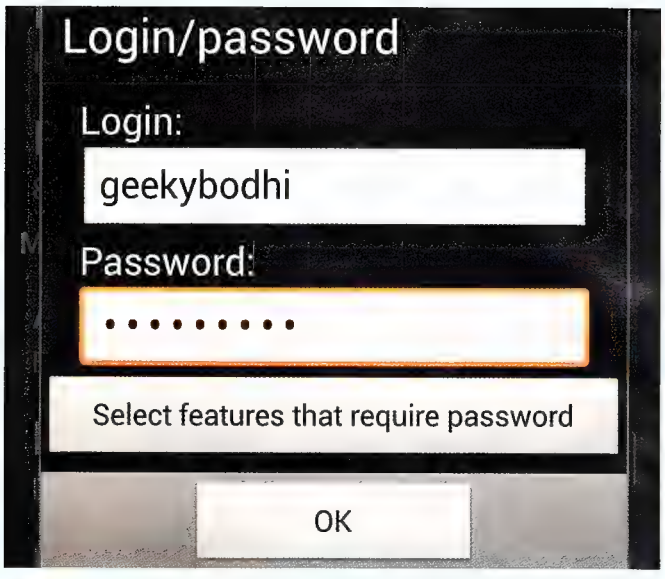
Smile for the camera.

IP Camera Adapter
Welcome to the IP Camera Adapter Setup Wizard
The installer will guide you through the steps required to install IP Camera Adapter on your computer
Cancel
Next

1 DOWNLOAD
IP Webcam is available as a free ad-supported download for your Nexus from Google Play. If you wish to use your old smartphone as a regular webcam, though, with a desktop app such as Skype, you also need to install the IP Camera Adapter app on your Windows computer; you can download this from **ip-webcam.appspot.com**.

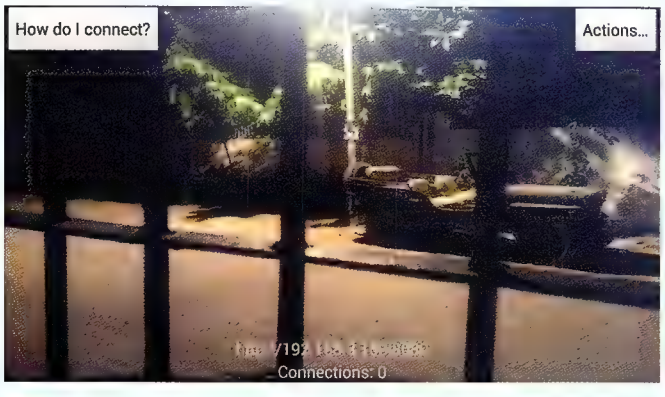


2 VIDEO SETTINGS
When you launch the app, you are shown a list of settings. However, you don't need to fiddle with each and every one of them. Some important ones that influence the quality of the captured video are 'Photo resolution', 'Video quality' and 'FPS Limit', so you may want to adjust these a little.



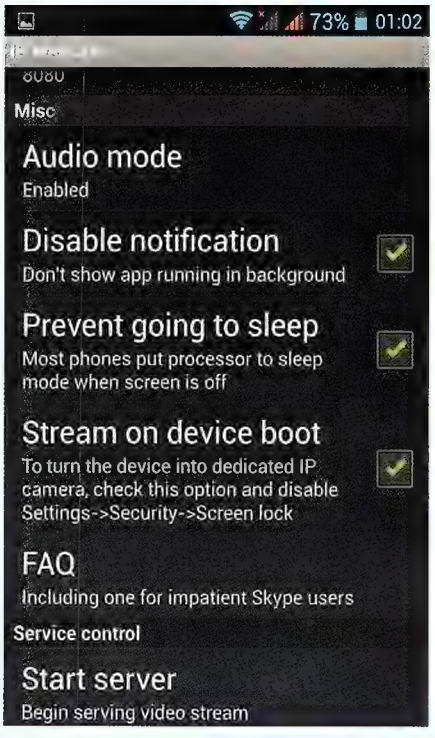
3 CONNECTION SETTINGS

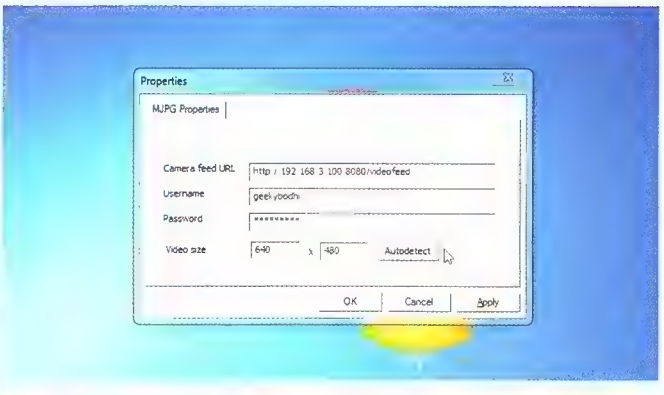
Scroll down the settings window to 'Connection settings'. Here you can define a username and password for viewing the stream; this is blank by default, so anyone can view the stream. Also make note of the numbers in the Port field.



4 DEDICATED SECURITY CAMERA

If you want to use the phone as a dedicated security camera, you need to disable the screen lock on the phone ('Settings > Security > Screen Lock') and select the 'Stream on device boot' option in the Misc section of the settings window.


73% 01:02
8080
Misc
Audio mode
Enabled
Disable notification
Don't show app running in background
Prevent going to sleep
Most phones put processor to sleep mode when screen is off
Stream on device boot
To turn the device into dedicated IP camera, check this option and disable Settings->Security->Screen lock
FAQ
Including one for impatient Skype users
Service control
Start server
Begin serving video stream

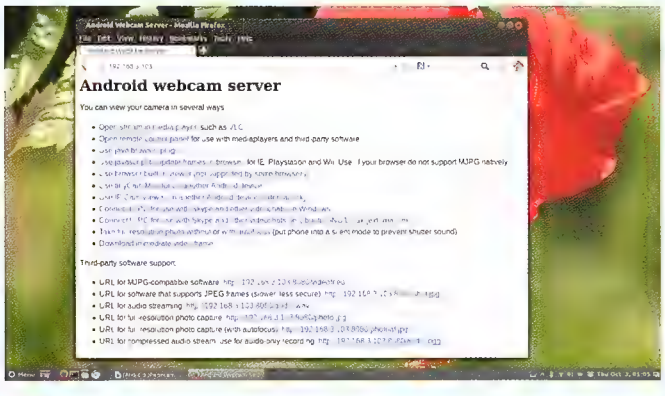


5 START STREAMING

Now click on 'Start server' to begin streaming the video. Along with the video from its camera, your smartphone also displays the IP address and the port number of the streaming server, together with the number of users who are currently watching the stream. As you can see from the above shot, nobody is viewing this stream at the moment.

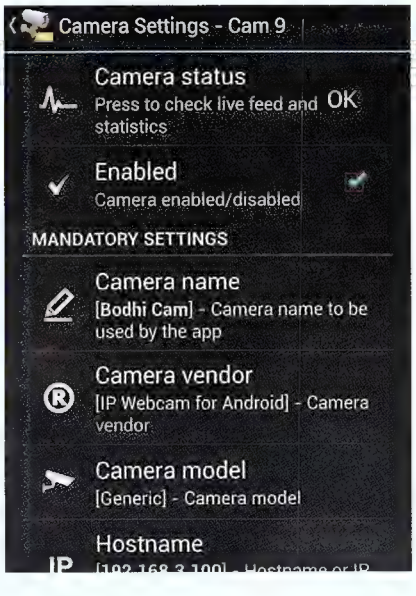
6 USE AS A WEBCAM

Next you need to open the IP Camera Adapter app that you installed on your Windows computer earlier, and fill in the required information, such as the complete IP address of the webcam, as shown in the previous step. Now click on Apply and then select MJPG from the list of available webcams in apps such as Skype.



7 VIEW STREAM ON COMPUTER

To view the stream on any computer that's set up in your network, you need to launch a web browser on your computer and enter the IP address that's displayed on your smartphone. This lists several ways that you can view the stream. Click on the first option to view the stream in desktop software such as VLC Player.

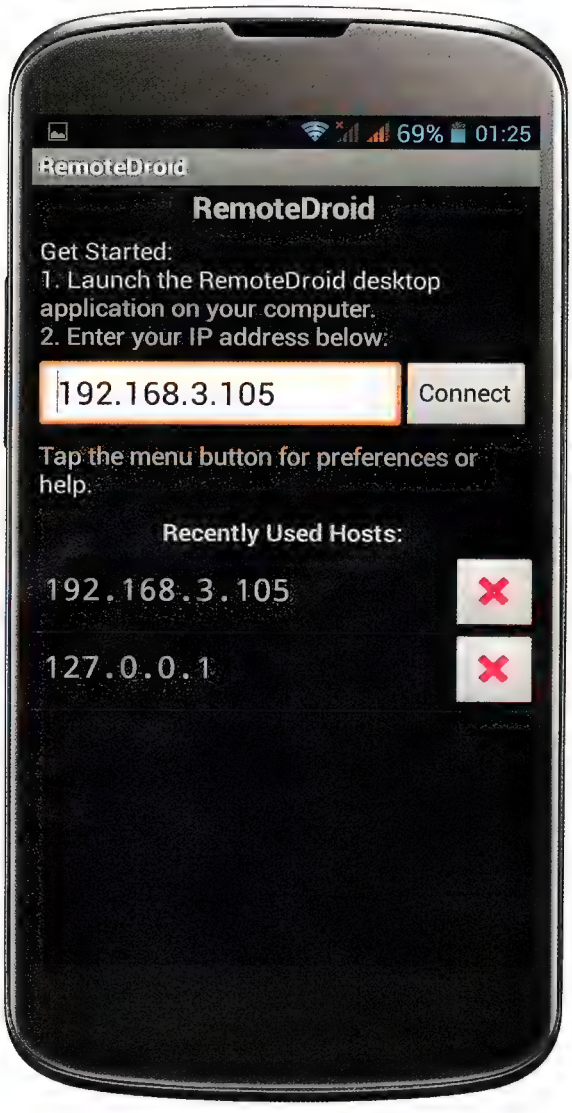


8 VIEW STREAM ON YOUR MOBILE

This requires the tinyCam Monitor app, which is free from Google Play. Launch the app and then head to 'Manage cameras > Add camera'. Select 'IP Webcam for Android' as the camera vendor, and enter the IP address of the streaming server in the space provided. Hey presto — you can view your old phone's video stream on your new phone.

Use an old Android as a touchpad

With RemoteDroid, you can use an old phone as a wireless mouse and keyboard.



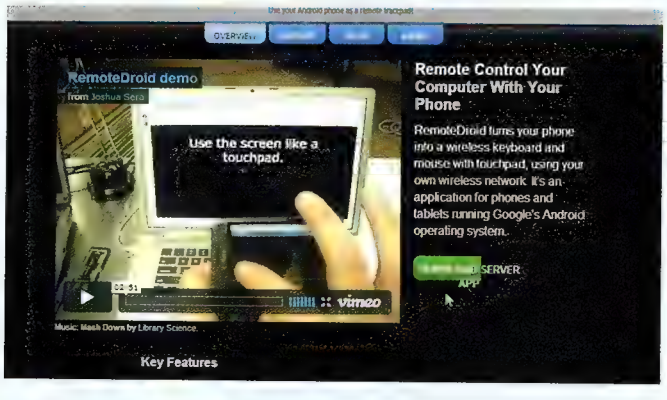
Thinking of getting a new mouse because your old one is giving you grief? Don't! You can effortlessly turn an old Android device into a wireless mouse and keyboard, complete with dedicated on-screen keys for the left-click and right-click, and an optional scroll wheel if your smartphone has a trackpad.

Using the RemoteDroid app, you can use the screen real-estate on your smartphone to control the cursor on your computer. This is especially useful when you are using the computer to give a presentation, because you can direct your audience's attention without being tied to the podium.

To use the app, you also need to install some software on the computer that you wish to control wirelessly. We explain everything in the walkthrough below.

Remote control your computer

Untether yourself from that mouse and keyboard.

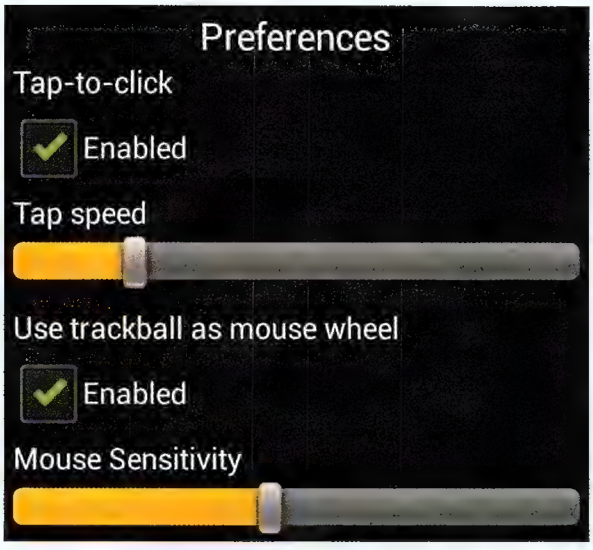

RemoteDroid demo
from Joshua Sera
Use the screen like a touchpad.
Remote Control Your Computer With Your Phone
RemoteDroid turns your phone into a wireless keyboard and mouse with touchpad, using your own wireless network. It's an application for phones and tablets running Google's Android operating system.
vimeo
Key Features

1 INSTALL SERVER

Before you get started, you need to download and install the server component of RemoteDroid on the computer that you wish to control from your phone. The server app is available from **www.remotedroid.net** and it requires Java SE Runtime Environment 1.5 or higher, which you can also install via a link on the RemoteDroid web site.

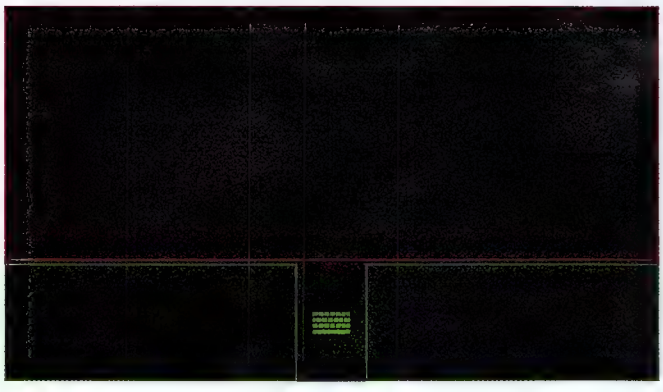
2 INSTALL APP

There are two versions of the RemoteDroid app. The free version has all the important features that are available in the $1.99 Pro version. The only difference is that the Pro app automatically connects to the server on the desktop.



3 SET PREFERENCES

When you launch the app, press the menu button on the phone and select Preferences. Here you can configure the behaviour of the app. For example, you can control whether a tap should translate into a left-button click.

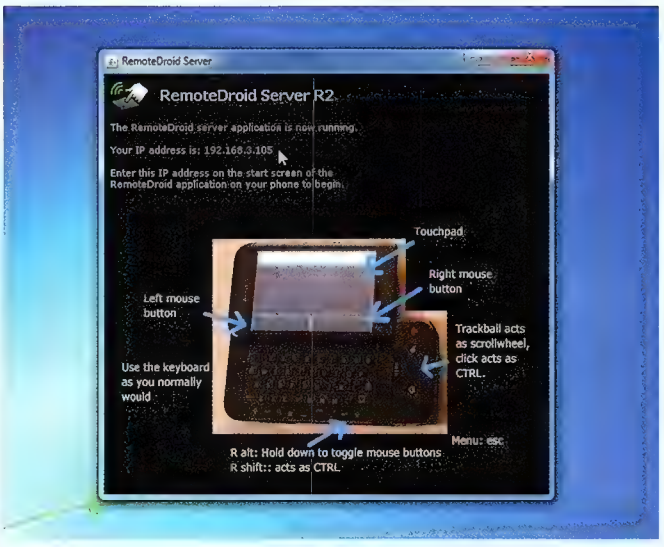


5 USE AS A MOUSE

Once the app has connected with the server software, the screen on the phone shows three boxes. The box highlighted in red is the mouse touchpad and the boxes in green are the left and right mouse buttons.

7 USE AS A KEYBOARD

The icon between the two mouse buttons brings up the default keyboard that you are using on your Android phone. You can then use it as a normal keyboard to type wirelessly. The developer of RemoteDroid is working on adding support for the Swype keyboard, which will make it even easier to type on your computer using your phone.


RemoteDroid Server
RemoteDroid Server R2
The RemoteDroid server application is now running.
Your IP address is: 192.168.3.105
Enter this IP address on the start screen of the RemoteDroid application on your phone to begin.
Touchpad
Right mouse button
Left mouse button
Trackball acts as scrollwheel, click acts as CTRL.
Use the keyboard as you normally would
Menu: esc
R alt: Hold down to toggle mouse buttons
R shift:: acts as CTRL

4 CONNECT

To control the app, you need to first start the server on your computer by double-clicking the RemoteDroidServer.jar file. This brings up a window on your PC screen which displays the IP address of the server. Now enter this IP address in the RemoteDroid app on your phone.

6 MULTI-TOUCH GESTURES

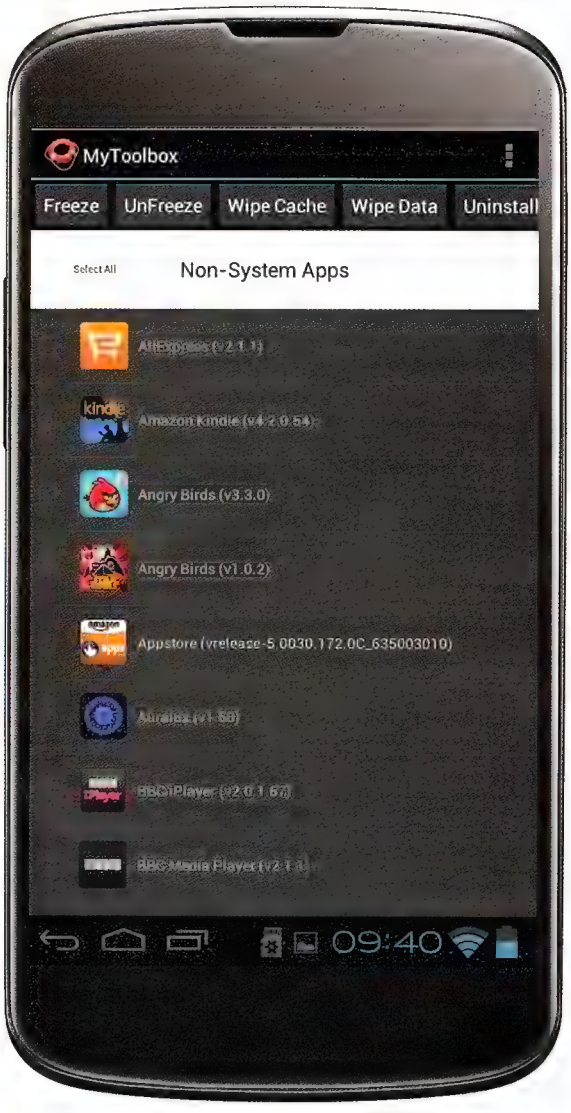
You can use the app in either orientation (such as portrait left), although it makes more sense to use it in landscape mode, and it's slightly easier this way. The app also supports all multi-touch gestures, including pan, flick, pinch close, pinch open, rotate, and more.

8 USE SOFT KEYS

You can also use the soft and hard keys on your Android device itself. For example, on our test device, the search button acts as the Alt key, but the behaviour of these keys varies from device to device, and it's possible that not all the keys are mapped. Next time your mouse or keyboard dies, don't immediately rush off to replace it — try using your phone instead.

Android-powered streaming music server

Discover how it's easy to remote control your music by using an old Android phone



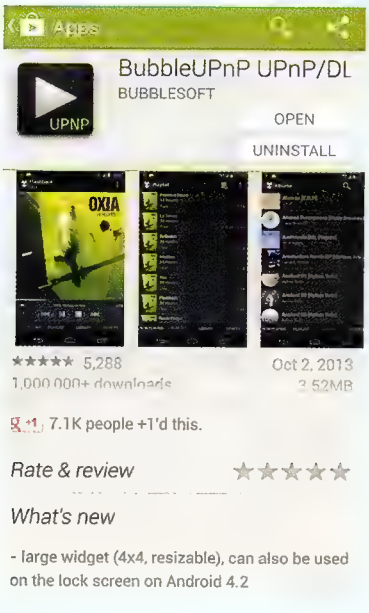
DLNA (Digital Living Network Alliance) is a powerful protocol for streaming media between compatible players. And guess what – you probably already own a bunch of devices that support this protocol. Yup, put down this magazine and check your TV, Blu-ray player, games consoles and other gadgets.

Even if you don't have a DLNA-certified device, you can use BubbleUPnP to turn an old Android phone into one. You can then load it up with music and hook it to a pair of speakers. Then grab another Android phone and load the BubbleUPnP app on that, too. Now you can use the second phone to remotely browse your music collection and control playback on the first phone attached to the speakers.

You can extend this concept by using the app to play music that's stored on one DLNA device on another. So if you have a DLNA NAS, you can make it stream the music it houses to the phone that's connected to the speakers.

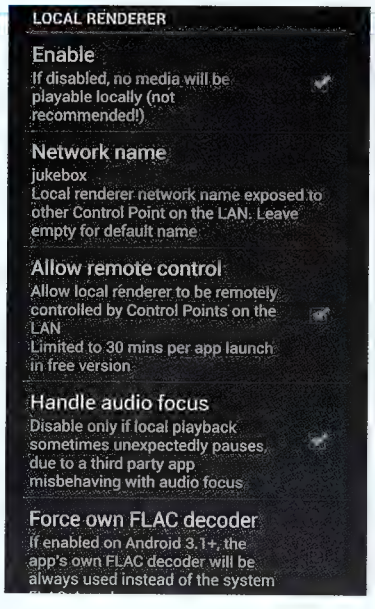
Stream music around your house

Fill the house with your favourite songs.



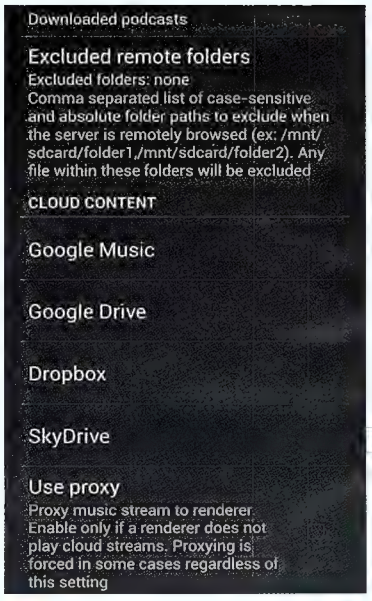
1 INSTALL BUBBLEUPNP

The BubbleUPnP app is available from Google Play as an ad-supported free download that restricts remote playback to 30 minutes. When you first launch the app, it asks you to configure internet streaming. You can safely skip this step, because this isn't what we are currently after.


LOCAL RENDERER
Enable
If disabled, no media will be playable locally (not recommended!)
Network name
jukebox
Local renderer network name exposed to other Control Point on the LAN. Leave empty for default name
Allow remote control
Allow local renderer to be remotely controlled by Control Points on the LAN
Limited to 30 mins per app launch in free version
Handle audio focus
Disable only if local playback sometimes unexpectedly pauses due to a third party app misbehaving with audio focus
Force own FLAC decoder
If enabled on Android 3.1+, the app's own FLAC decoder will be always used instead of the system

2 SET UP THE APP

In the app, click on the Menu button and go to 'Settings > Local Renderer'. Make sure the 'Allow remote control' option is selected and use the 'Network name' field to customise the name of the device. This is how this phone will appear to other devices.


Downloaded podcasts
Excluded remote folders
Excluded folders: none
Comma separated list of case-sensitive and absolute folder paths to exclude when the server is remotely browsed (ex: /mnt/sdcard/folder1,/mnt/sdcard/folder2). Any file within these folders will be excluded
CLOUD CONTENT
Google Music
Google Drive
Dropbox
SkyDrive
Use proxy
Proxy music stream to renderer. Enable only if a renderer does not play cloud streams. Proxying is forced in some cases regardless of this setting

3 SETUP CLOUD LIBRARIES

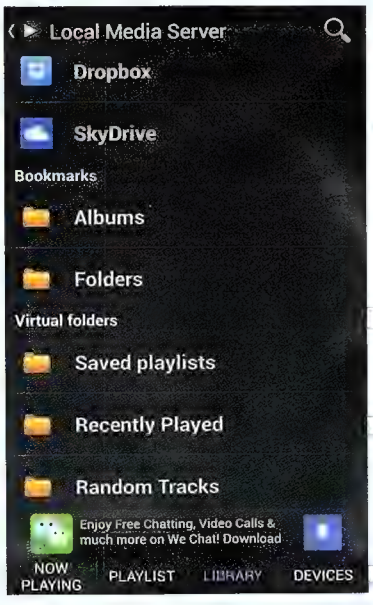
Along with music stored locally on the device, the app can also play music on cloud services such as Google Music and Dropbox. Tap the Menu button and head to 'Settings > Local Media Server' and enter your login details for the relevant supported services.

4 HOOK 'EM UP

Now you can connect your old Android phone to any pair of speakers you have, using the standard auxiliary ports on both the phone and the speakers. You've now converted your speakers into smart Wi-Fi-enabled ones that can be controlled remotely.

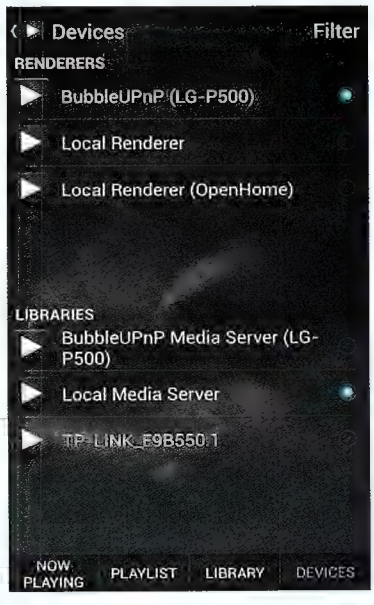
5 INSTALL BUBBLEUPNP ON CONTROLLER

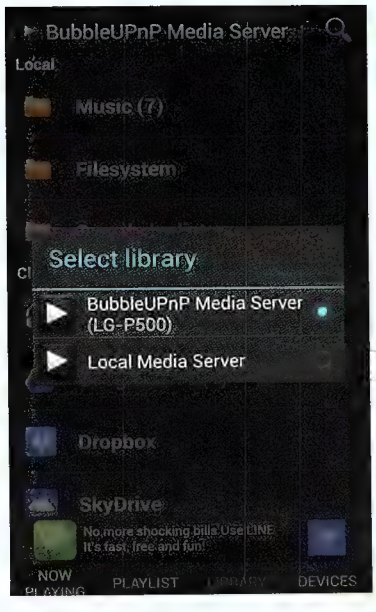
In order to remotely control playback on the Android phone that's connected to the speakers, you need to install the free BubbleUPnP app on another device as well. After you've set up and tested your streaming rig, you can download the licensed version of the app for $4.69.



6 SELECT RENDERER

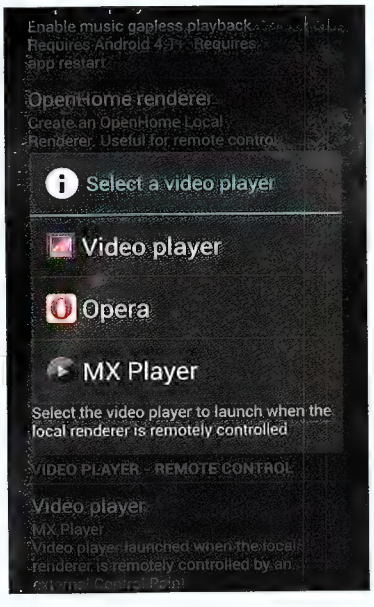
Now launch the app on the new device and switch to the Devices tab. In the list of Renderers, select the name of the old Android phone that you've hooked up to your speakers. From now on, any music you select to play on this phone streams to the remote speakers.





7 REMOTE LIBRARY

To play music that's stored on the old phone, switch to the Devices tab and select the name of the old Android phone in the list of Libraries. The Library tab now shows music on this remote phone, and a selected track plays on the remote speakers.


Enable music gapless playback
Requires Android 4.1+. Requires app restart
OpenHome renderer
Create an OpenHome Local Renderer. Useful for remote control
Select a video player
Video player
Opera
MX Player
Select the video player to launch when the local renderer is remotely controlled
VIDEO PLAYER - REMOTE CONTROL
Video player
MX Player
Video player launched when the local renderer is remotely controlled by an external Control Point

8 PLAY VIDEO

If you need to play a video on the remote device, you need to install a dedicated video player, because BubbleUPnP can't play back videos on its own. Just head to the old phone or tablet that you want to use to play back the video, and install a video player such as MXPlayer.

DIY Nvidia Shield

Make your own Steam-streaming Android with a little help from Neil Mohr.

In the past, we've looked at how you can use Windows Remote Desktop Protocol to connect to any Windows system and control it remotely, using pretty much any device.

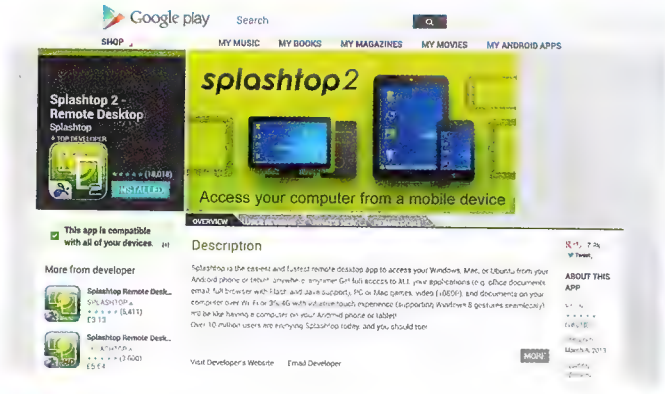
However, although Windows RDP is fast in terms of windows refresh, it's not optimised in any way for gaming or video. If you play a full-screen video you'll get a frame or two a second at best – nowhere near the 30fps you'd want for enjoyable viewing, and gaming is out of the question.

Once more, technology has come to the rescue. A long-standing app called Splashtop, which is available for Android, Apple iOS and WebOS mobile devices, enables remote high-speed, low-latency sharing on Windows, Mac or Linux desktops. The downside is that it achieves this through a more CPU-intensive high-quality encoding system than RDP. That said, the CPU overhead isn't too significant – around 9-15% for a second-gen Intel Core i5. If you're running something more sluggish like an AMD Athlon II 1.5GHz, it's more like 30%.

Splashtop is also different to Windows RDP in that it runs on top of the current logged-in user account, whereas RDP requires a specific user account to log in. It might seem an odd differentiation to make, but it has security implications.

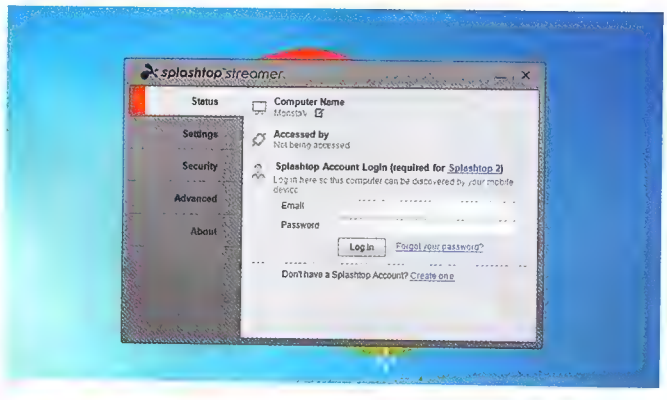
Diving into Splashtop

Take a tablet, a network and a PC, then get connected.



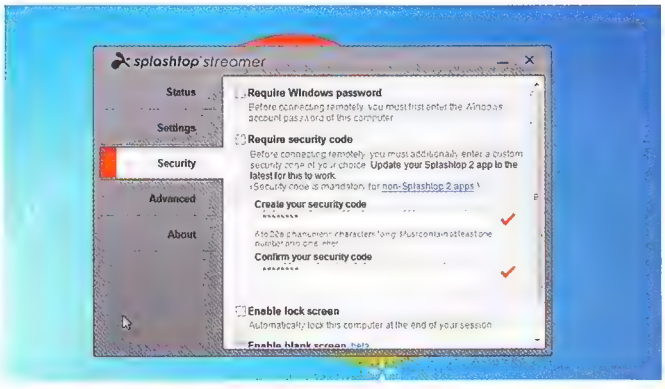
1 SPLASH ONE, TWO

Both the free Splashtop 2 and paid-for Splashtop THD apps are available on Google Play. Splashtop 2 is the latest and fastest version, but there's a fee for internet access and gaming. Splashtop THD is an Nvidia gaming version designed for Tegra devices, with pre-configured game controls and support for free internet access. We'll look at both.



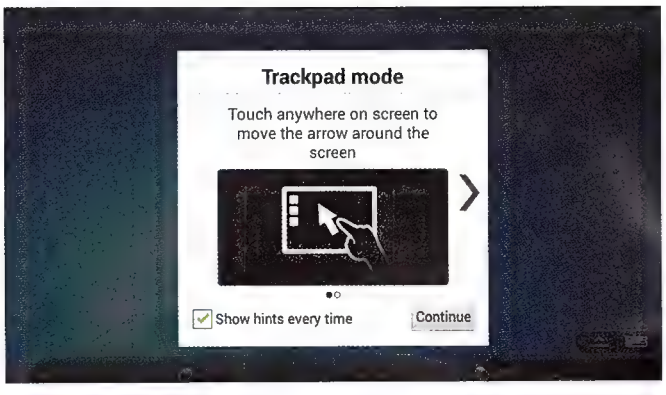
2 DESKTOP SPLASH

You'll also need to install the Splashtop desktop streamer on any system you want to access remotely. It's available from **www.splashtop.com**, and supports all versions of the mobile app. Splashtop 2 users will need to create an account for general use. This is also used for billing and remote logging access.



3 STAY SECURE

Splashtop's Desktop Security tab offers a number of useful tools. The security code is aimed at older versions when connecting locally or remotely over the internet. You can force newer versions to use this, or to request your Windows account password. The Lock and Blank options are useful for securing the remote PC during use.



5 CONTROLS AND GAMES

In direct-to-click mode, a single tap represents the left mouse button and a tap-hold represents the right. A two-finger tap switches between direct-to-click and trackpad mode, where dragging anywhere on screen moves the mouse while retaining an absolute position. For gaming controls, Splashtop 2 requires a subscription.

7 BETTER GAMING

A three-finger-tap opens the gaming controls. You can also tap the '+' button to move and adjust the default on-screen controls. The pad icon switches back to the standard trackpad control system. Wired and Bluetooth controllers are supported via Android ICS gamepad support, with a few key-binding adjustments on the PC end.

4 DESKTOP RESOLUTIONS

If Splashtop is running on your desktop, the app will display systems ready for connection. Desktops that are greyed out are ones you've used before, but are currently unavailable. Tap the far-right end of a desktop entry to see a list of resolutions. We recommend 'Best fit', or a device-native resolution such as 1,280 x 800 for the Nexus 7.

6 GAMING THD

For Nvidia Tegra devices, Splashtop THD comes with predefined controls for *Skyrim, Diablo III, Portal 2, WoW, PES* and *Civ V*. You can use these presets with other games, too. The main limitation is that games have to be played in window mode. It's best to put the taskbar onto autohide and tweak the positioning of the game window.

8 INTERNET TOO

As Splashtop 2 requires a subscription for internet access, you might want to buy Splashtop THD instead. The older versions use your Google account to link through to your desktop, while Splashtop 2 uses its own account system. If your router's UPnP isn't playing nicely, forward port 6783 to the system's IP address.

how to

» QUICK TIPS

Experts solve your computing problems

APC and its readers can be one giant helpdesk. If you have a technical problem, chances are one of us can solve it.

Some USB hubs can significantly slow down data transfer speeds.

HARDWARE

SLOW USB TRANSFER SPEEDS

I have an AMD Althon 64 X2 4400+ with a GeForce GT 210. It served me well until this year. I can't copy something from my external to my hard drives or vice versa — or even from one internal hard drive to the other — faster than 1MB/s.

I used to play games from my external drive, but I now have to copy these to my internal hard drive. Oh lordy, it takes so long!

Nico Slabbert

It's no use praying to the gods of Finnish heavy metal; we need to take a hard look at your numbers. If you are measuring one megabyte per second, that equals eight megabits, which is just slightly under USB 1.1 speeds. There's no way your motherboard is old enough to still have USB 1.1 ports on it, but it's just about conceivable that you are trying to connect through some dreadful USB hub you fished out of the skip at work.

More likely is that your cable or your port has broken or mucky pins, and you are losing speed through constant protocol renegotiation by the driver. Change the USB cable if you can, or clean the contacts with a cotton bud dipped in vodka or gin (both of which provide a handy mix of alcohol and water, without anything else in there that might leave a residue). Also try a different port on your motherboard.

But none of this would have any effect on transfer rates between two internal drives. Make sure both drives are using AHCI (Advanced Host Controller Interface) mode in the BIOS, rather than one of the older legacy modes.

Also, if one or both of the drives are solid-state then it makes a big difference whether you're copying lots of small files or a few larger ones, and whether you're copying or moving. In the worst case scenario, moving lots of files under 4KB can drop to 1Mbit/s on some SSDs, due to the inefficiencies of the move operation.

Luis Villazon

NETWORKING

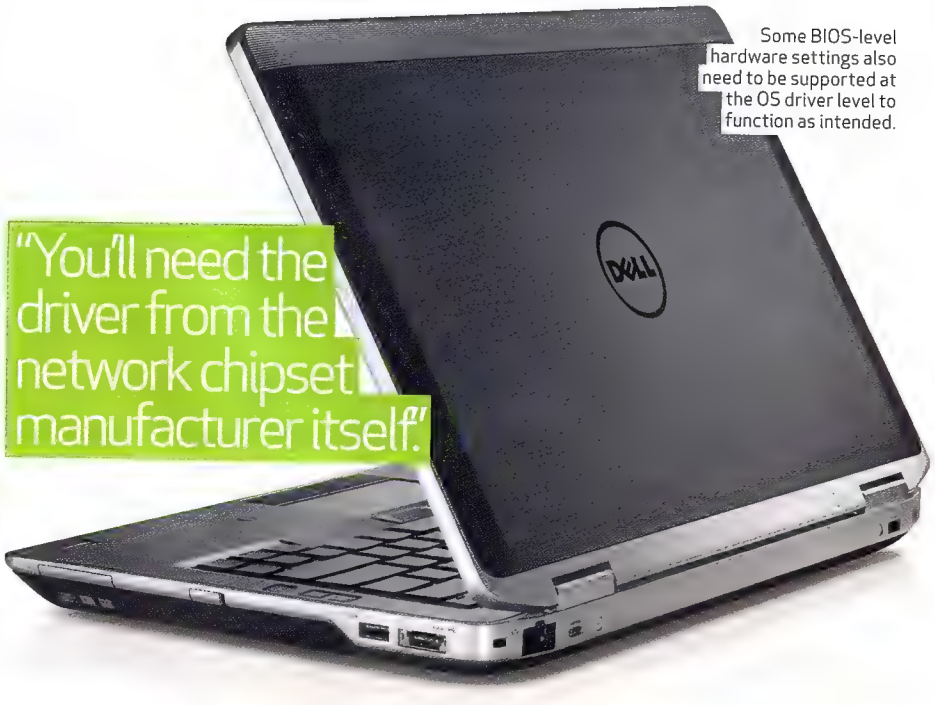
SELF-SWITCHING NETWORK

I have a Dell Latitude E6430 laptop with both Wi-Fi and cabled network options. When I plug in the cable, the Wi-Fi connection switches off, even though I don't want it to. I have looked in the BIOS and there is a setting to enable and disable this. I have it set to disable the switching, but it still switches. Please could you tell me what is going on?

Harry Maslin

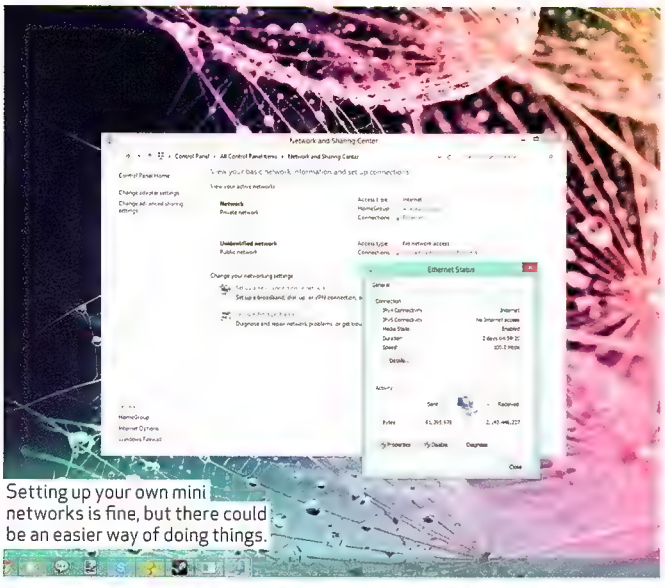
The automatic switching is contingent on two things working correctly. The laptop has to detect that a network cable is electrically connected and the driver has to detect that the network connection exists at a logical level. I've seen laptops with bent pins on the Ethernet socket that won't reliably sense the cable, and so won't switch over to the wired connection. That's not what is happening here because you have the opposite problem, so I think this is caused by the driver for your network interface controller (NIC). When the cable is plugged in, the motherboard recognises that the wired connection exists, but so does the Windows driver. The driver misidentifies the capabilities of the NIC and thinks that it can only handle one network protocol stack at a time, so it routes all the traffic though the default stack, which is for the wired connection.

This isn't something that I've seen under Windows 8 yet, but I've come across it before with Windows 7 SP1. If you are still using an OEM copy of

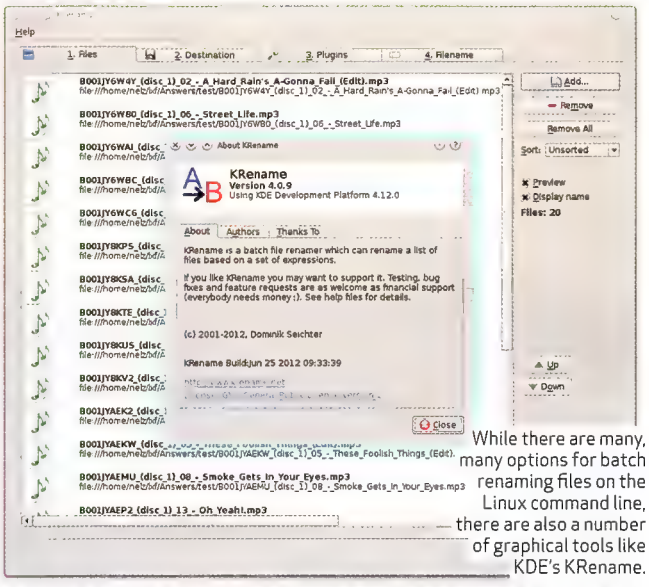


Some BIOS-level hardware settings also need to be supported at the OS driver level to function as intended.

"You'll need the driver from the network chipset manufacturer itself."



Setting up your own mini networks is fine, but there could be an easier way of doing things.



While there are many, many options for batch renaming files on the Linux command line, there are also a number of graphical tools like KDE's KRename.

Windows 7 (in other words, the copy of Windows that came pre-installed with your laptop), then running Windows Update won't be enough. Neither will downloading the current drivers for your Latitude from Dell. You'll need the driver from the network chipset manufacturer itself, which in your case is Broadcom. Go to **tinyurl.com/b7r8w**.
Luis Villazon

NETWORKING
SUB-PAR SUBNETS

I have two laptops and a desktop PC in my household. The laptops are connected via Wi-Fi to the wireless router using IP addresses set to DHCP. They are 192.168.1.25 and 192.168.1.26. Also plugged into this is a second router, connected via Ethernet cable, and this router supplies a wired connection for the desktop PC using IP address 192.168.2.25. My problem is that with the laptops turned off, the desktop can connect to the internet, but with either laptop switched on, the desktop loses its connection. This is annoying from the point of view of the internet, but it also means that the desktop cannot access shares on the laptop, and vice versa. My understanding was that using different subnets would allow all three devices to remain separate but communicating.
Anton deVries

Yes, well, your networking know-how appears to be deep enough for you to make a very complicated network for three computers, but not deep enough to actually get it to work. I think what you have probably done is messed up the network masks on the routers, so that the 192.168.1.x and 192.168.2.x address ranges are treated as the same and the IP addresses collide.

But that doesn't really matter. The fact is that you don't need subnets at all for a simple home LAN with three computers. Separating traffic like this is used to preserve bandwidth in large networks by restricting the amount of traffic that is global to the whole LAN. If you are connecting the desktop PC via cable, you don't even need a second router. You can get cat-5 Ethernet cable in arbitrarily long runs — up to 100 metres. Just put the desktop on the same 192.168.1.x subnet and let it grab its IP address via DHCP. Your problems will melt away.
Luis Villazon

LINUX
ELEGANT RENAMING FOR INELEGANT FILES

I have downloaded a lot of MP3 files I've purchased online and they have names like this: B00EXWBVRM_(disc_1)_09_-_Why'd_You_Only_Call_Me_When_You're_.mp3. Do you know a quick and dirty (or slow and elegant) way to strip the rubbish off the names leaving eg Why'd_You_Only_Call_Me_When_You're_.mp3?
PK

This is one of those questions that has more solutions than the number of files you want to rename. You can pipe the names through sed or tr, passing the output to mv. You could use a graphical tool like Krename or one of the command line utilities or commands dedicated to this task, such as mmv or rename. The rename command is provided by the util-linux package, and therefore installed on all Linux distros, but the one you want is a different program with the same name, available from **rename.berlios.de**. Some distros install this under a different name, such as renamexm, while others rename the original rename to rename.ul. That sentence, like many distros, has too many renames.

Rename uses both standard and extended regular expressions for the matching, depending on the options you pass it. Based on the example you have given, this should rename that file:

```
rename -t -s/.\*_\[0-9\]\
[0-9\]_-_//r *.mp3
```

The -t, or --test, tells Rename to print what it would do rather than actually renaming anything, keep this until you are happy with the results. The -s option specifies the search and replacement strings, separated by slashes (just like sed). The backslashes are because this command is being typed in a shell and we don't want it to try to expand * and [].

The search string is:

```
.*_[0-9][0-9]_-_
```

That's any number of characters followed by _ two digits and _-_, which matches the example you gave. The replacement string is empty, so this part of the name is simply removed, and the r at the end tells Rename that this is a standard regular expression. Use e for Egrep style extended regular expressions. If you can be more specific with the patterns, do so as it reduces the risk of mismatches.

As well as working on individual files, or wildcard lists like *.mp3, Rename also has a recursive option that renames all files in the given path and all its subdirectories. As Rename does not touch files that do not contain a matching pattern, it is safe to run this over your entire music directory every time you add more files.

```
rename -R -t -s/.\*_\[0-9\]\
[0-9\]_-_//r ~/Music
```

Once you are happy that Rename is doing what you want, either remove the -t option or replace it with -v and let it rename away.
APC staff

Keep Windows XP forever

Microsoft may have pulled support, but XP is far from dead. Chris Lloyd explains why.

Everybody panic now. Microsoft has stopped supporting Windows XP, which means no more security updates or patches. Planes could fall from the sky and power stations could run backwards. It's time to freak out!

Or not. In fact, after 8th April not a lot will have happened really. Is there any real cause for concern? Can you keep trucking with XP like you just don't care? Probably, but there are ramifications.

The biggest of these is security. No more of those annoying updates that install themselves at inopportune moments. Postpone, postpone. No more antivirus and malware updates, and no patches to cover those little holes in the code. In a rather cheeky snippet from Microsoft's Security Intelligence Report, the company claims that Windows XP is now riskier than ever and urges everybody to upgrade. Apparently XP boxes are six times more likely to be hosting unwanted guests than those running Windows 8.

Microsoft has learned lots of lessons about keeping systems safe. These are built into the core of newer versions of Windows, while XP has simply been patched over as well as possible in the meantime. As hackers learn the ins and outs of an OS, they get better at targeting the weak points. Unsupported software is a tempting target; witness the trouble IE 6.0 users can get into. It could be really bad.

There are some proper scare stories out there too, with so-called 'experts' predicting that hackers will descend on the newly defenceless XP boxes and do all sorts of nasty things. Some of the best of these are from 'undisclosed sources' inside major corporations. There are also some leaden Microsoft marketing campaigns aimed at government departments and corporations, which employ such dire

TOP TIPS

DON'T CLICK ON THAT LINK!

Links embedded in emails are a classic way for nasties to get onto your system. It may look like a safe link, but what's that long string after the address? That's malicious code.

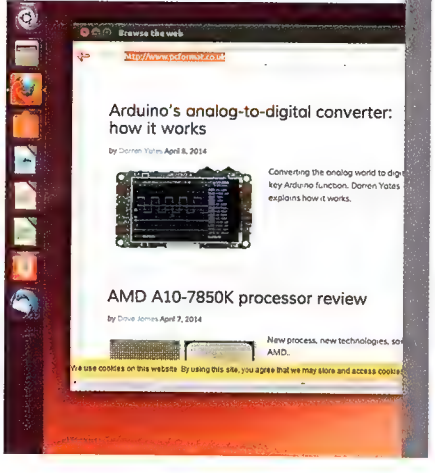
Won't upgrade? Can't upgrade!

What are your options if your machine can't handle a newer OS?

Apart from the obvious possibility that you have turned into a curmudgeon who refuses to pander to the modern world, there are lots of reasons for sticking with XP. Maybe you have a lovely, big old-school printer whose drivers require it. Or, on a more practical level, your box may not be up to it.

Windows 8 won't get out of bed for anything less than a 1GHz chip backed by 2GB RAM and a DX9 graphics card. If your machine is old enough to have come with XP installed, it's probably not a good idea to burden it with such an impossible task. It'll turn into a laboriously slow thing wading through particularly thick treacle. XP was happy with 300MHz and 64MB of RAM (and it has been for 12 years).

Have you considered Linux, sir? The city of Munich did, and has plans to hand out free copies of Ubuntu to its citizens. Linux comes in a confusing number of flavours, but Ubuntu was designed for Linux newbies with an eye on smooth transfers from the world of Windows. Its desktop can be made to resemble Win7, and it'll run happily, and speedily, on more challenged hardware (it can run on as little as 64MB of RAM). There's a ton of high-quality applications and utilities. Oh yes, and its free.



warnings as: "Meeting today's demands with yesterday's solution can impact your mission." This next to a picture of some burly firemen. You get the idea – if you don't upgrade you will be burnt to death in your beds. Well, not quite, but subtle it ain't.

HANGING ON

So is it all over for XP now? Not a bit of it. For a start, there are more XP machines out there than you might think. Microsoft itself estimates that 21% of desktop PCs are running XP, and *The Economist* reckons on 39% of business machines are still running it. Even in the high-power gaming circle there are plenty about. Steam estimates that about 14% of its users are running XP.

The withdrawal of support might look like a poor way to treat those tens of millions of customers, but Microsoft can't be expected to support old versions forever – even ones that are massively popular. We all knew it was coming. That large installed user base is good news, too. Microsoft may have pulled the support plug, but everybody else is free to continue, and they will do so for as long as the demand is there. With a few simple steps and a little care, your XP box will be good for as long as you like.

> "Unsupported software is a tempting target; witness the trouble IE 6.0 users can get into. It could be really bad."

ETERNAL LIFE

If you want to be absolutely sure you won't be compromised, just go offline. It's a little drastic, but it's safe. If you just use a second XP box to run a favourite old game or app, you can network it to your main system and keep it away from any software upgrades. All things being equal, it should chug along nicely forever. Well, not quite, because Windows has an annoying habit of somehow managing to clog itself up after a few years of use whatever you do, but close enough.

If self-imposed internet isolation appears a bit extreme then there's still no reason to get too worried, but you will need to start putting those security precautions you learned a long time ago to use. We all know what good practice is – we just don't always follow it. Good advice such as not resting your coffee cup on a machine, or not running a system without a case, or not doing both.

Microsoft has a vested interest in getting people to upgrade, of course, and it's not all about the money (although quite a bit of it is). Progress means dropping old systems, and internet security means keeping things tight and up to date. We will all upgrade at some point, but if you have a faithful old XP system you don't need to worry, or change it if you don't want to. You will have to take a bit more responsibility for keeping it in good order though.

It could just go horribly wrong of course, with some nasty backdoor vulnerability exploited on a large scale, but that's unlikely. We've been here before. Anybody who managed to survive the big computer crash of the millennium will testify that, in fact, it wasn't quite as bad as it was painted.

XP has actually had a pretty good run – over 12 years of support is well above average for an OS – and it will take a long time to fade away. There are lots of XP systems running undemanding applications in quiet corners of the world where there is no real reason to upgrade at all. We all probably will at some point of course, but there's no need to rush.

Panic over.

TOP TIPS
CAREFUL WITH CODECS

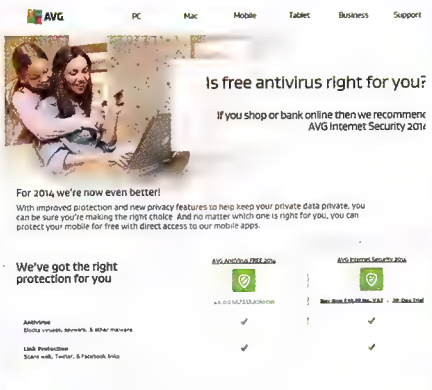
Another way for malware to get onto you PC is via a tempting app or utility, such as a video that won't play unless you download a new codec for Media Player. Only it isn't a codec, it's a virus.

Tackling infections

XP will still have decent protection for some time to come.

1 SECURITY ESSENTIALS

Support for Microsoft Security Essentials was originally going to be pulled on D-Day itself, but it won a brief reprieve. It'll now get updated signatures until April 2015, which is nice, although apparently it will also nag you that you are running an old and insecure OS. That said, MSE was never the best security software anyway.



2 ANTIVIRUS

In a recent poll by AV-Test, 30 leading antivirus vendors all indicated that they would continue XP support for at least a year, and most beyond that. Bitdefender says it will keep going until 2017, and Kaspersky until 2018. Symantec is less forthcoming, but it won't leave you hanging. The usual suspects are still good for up-to-date protection.

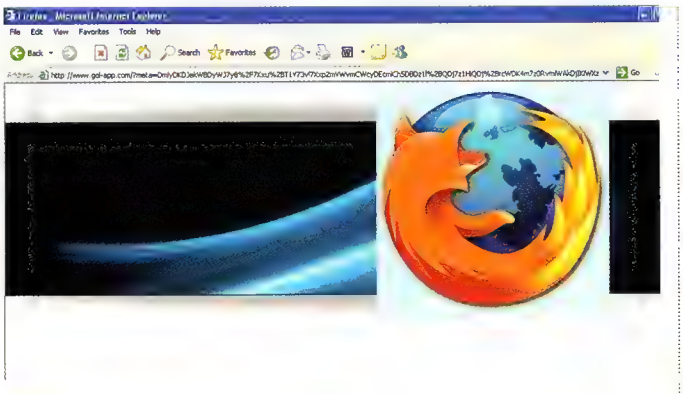
CNET Editor's rating Outstanding

3 MALWAREBYTES

If your PC is infected, one of the best tools for cleaning things up is Malwarebytes Anti-Malware. This does a really good job of catching things that have snuck through other defences, its worth scanning your drive with this every now and again, or if you have any suspicious behaviour. The company says it will continue with XP support "for some time".

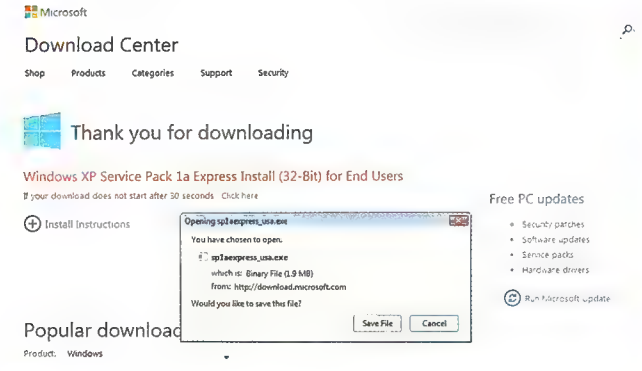
Practise good practice

It's time to kick sloppy habits and start taking defence more seriously.



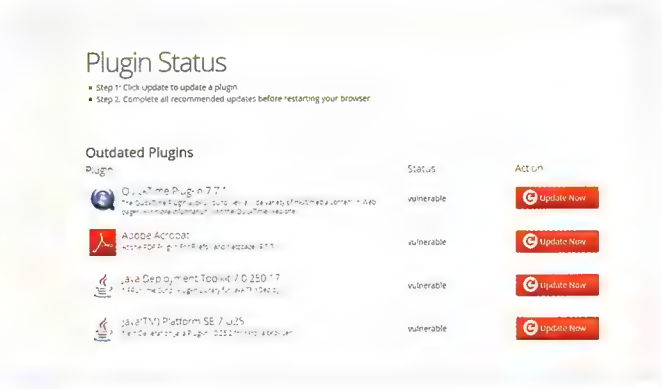
1 GET A NEW BROWSER

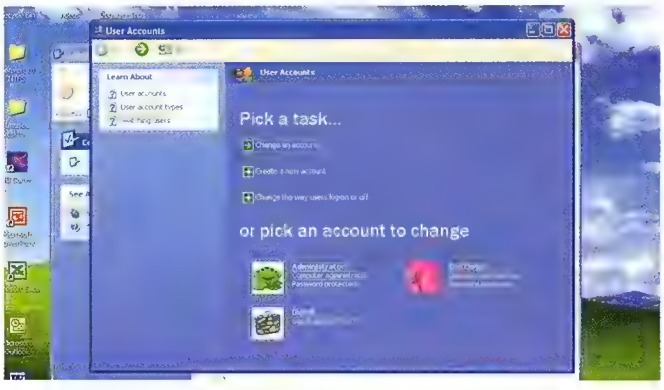
Say goodbye to Internet Explorer. With no more support, it's time to move to Firefox, Chrome or Opera. Install one and kill IE. Details are sketchy at the moment , but the big three all claim they have no immediate plans to ditch active XP support before 2015 at the earliest. Actually, its good news for them, as they have millions of new potential users. Oh the irony. If you do nothing else, do this.



2 SAY FAREWELL TO JAVA

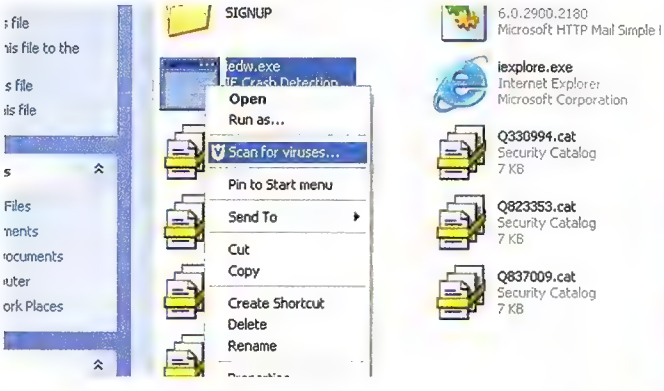
The Java browser plug-in is particularly prone to be being a little leaky, and is a nice way for code to get itself run without permission. If you can live without it, disable it. Other plug-ins can be troublesome too — Adobe Flash and Reader in particular. Use the Mozilla Plugin Checker (**www.mozilla.org/en-GB/plugincheck**). This'll show you what needs updating.





3 BACK IT UP

Prepare for XP reinstallation, because you know you'll have to do it at an inopportune moment. If your XP disc is an older one then having the patches stored locally, preferably on another drive, will save you a lot of grief. It's a lot faster, and you don't have to go online with XP unpatched. Keep copies of drivers that you know XP likes best too, especially for your network and graphics cards.



4 LIMIT PERMISSIONS

To protect your XP install stop running in Admin mode by default. If you don't have users with limited permissions, now may be the time to start using them. This will stop unwanted executables from putting themselves about. Go to User Accounts in Control Panel and create an Admin account. Log in using it, go to your user account and change it to a Limited account.

5 CHECK IT OUT

If you've any doubt at all about something you are about to install, scan the file before you run it — especially if it's a package that's new to you. Right-click on the executable and select 'Scan with [your security software]'. This will be Microsoft Security Essentials, unless you have third-party security software running.

6 WALLED IN

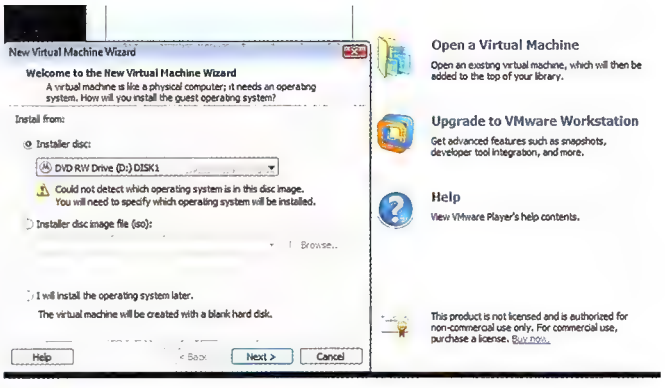
You may like to start using a third-party firewall if you aren't doing so already. Microsoft's XP firewall was always pretty lightweight anyway. Top contenders are Zone Alarm and Comodo. Both are available as free versions, and both promise to continue with Windows XP support for the time being, too.

Going virtual

You can keep XP *and* upgrade.

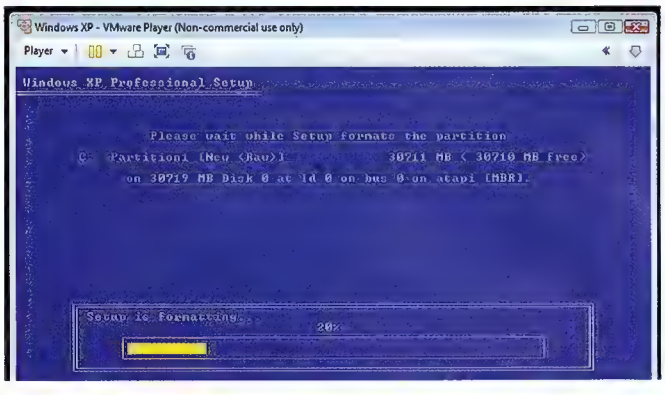
1 GET VMWARE

You can run XP on a Windows 7 PC by creating a virtual machine. We prefer to use VMware, as it's a little faster and more flexible than Microsoft's Virtual PC. Finding the download link is a pain, though. Go to **www.vmware.com/au/products/player** and scroll down until you see 'Free for personal use'.


New Virtual Machine Wizard
Welcome to the New Virtual Machine Wizard
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (D:) DISK1
Could not detect which operating system is in this disc image. You will need to specify which operating system will be installed.
Installer disc image file (iso):
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
< Back
Next >
Cancel
Open a Virtual Machine
Open an existing virtual machine, which will then be added to the top of your library.
Upgrade to VMware Workstation
Get advanced features such as snapshots, developer tool integration, and more.
Help
View VMware Player's help contents.
This product is not licensed and is authorized for non-commercial use only. For commercial use, purchase a license. Buy now.

2 INSTALL XP

Install the program and fire it up. Select 'Create a new virtual machine' and pop your XP disc in the drive, or direct it towards an ISO file and off you go. You can create as many virtual machines as you like. It's a great playground for testing, and if it gets mangled of infected, you can just delete it and use another.


Windows XP - VMware Player (Non-commercial use only)
Player
Windows XP Professional Setup
Please wait while Setup formats the partition
C: Partition1 [New (Raw)] 30711 MB (30710 MB free)
on 30719 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]
Setup is formatting...
20%

3 KNOW YOUR LIMITS

This looks worrying, doesn't it? It isn't formatting your drive of course — it only thinks it is. There's no direct link between the software drivers of the virtual machine and your hardware. This means you won't get decent graphics because it can't get at your 3D card, so other than Solitaire, games are out.

Windows XP
Windows XP Professional Setup
Collecting information
Dynamic Update
Preparing installation
Finishing installation
Setup will complete approximately: 33 minutes
Your Product Key
Your Product Key uniquely identifies your copy of Windows XP.
PRODUCT KEY:
The 25-character Product Key appears on the yellow sticker on the back of your Windows CD folder.
Type the Product Key below:
Product Key:

4 REGISTER AND GET STARTED

And here is XP running in a window, ready for you to enter the product key (you'll still need a kosher copy of the OS, of course). There is still a degree of integration with the outside world — you can launch your XP apps from outside the virtual machine for example, and create shared directories for data.

Fade away and radiate

We like Windows XP. It has a solid kernel running NT code, but with all the friendly bits of Windows 98. It isn't weighed down with too many pointless gimmicks and flashy visual effects, and the hardware requirements are modest. It's been around long enough (and received enough patches) to become good and stable, and has been updated to run the newer hardware standards.

We're not alone in our appreciation of the venerable operating system — it shifted over 800 million copies, making it the best-selling version of Windows ever.

Microsoft struggled to get people to upgrade to Vista, which wasn't helped by its poor initial reception. A lot of people – including, critically, business users – chose not to upgrade at all, and there are still far fewer Vista machines than XP boxes in the wild. Most people decided to wait until Windows 7, and even then a stubborn set didn't make the leap. XP Mode was added to Windows 7 to help push things along faster, but it has proved a very tough act to follow.

There's a fair amount of back and forth about XP and its demise, but most of this isn't aimed at you. Microsoft wants to get the business market shifted over to newer, safer and more modern software.

It really doesn't care about old XP machines chugging away in back bedrooms and being used to play old games. It probably wants you to buy an Xbox One instead, but that's another story entirely.

The end of direct support is a setback, but it was inevitable, expected, and not the end of the road. It does mark the start of a downward curve, though. If you run an unsupported OS you'll have to be a little more careful about security and think twice about upgrading any bits of software, but there's no reason why your XP box can't be as effective now as it was before. You just won't be able to phone Microsoft technical support about problems, which, all in all, isn't that big a loss.

Push Android notifications to your Linux PC

Who's that calling? What's that alarm? Neil Mohr is sick of people pestering him on his phone, time to hack in desktop notifications.

Browser add-ons offer handy ways to integrate Android.

Until we're carrying around phone devices that are running full desktop Linux – and those days aren't too far off – there's always going to be a divide between our phones and our desktops. In many ways that's not actually a problem, as we presume most of us sit there with our phones on our desks. So when a call comes in, an alarm goes off or a calendar event springs up, we can spy the flashing, beeping device or hear it playing the Crazy Frog theme – as we're so 2005 it hurts.

There are many times though when that's not good enough. The phone could be in another room, you might have it set to silent or you could have donned industrial ear protectors to drown out the drawling of your work colleagues. It's at these times that you need some sort of smartphone to desktop communication. Enter LinConnect a smart little Android app that can bring all of your phone notifications to your Linux desktop.

How does this magic work? As you might suspect it's a client-server system that runs over your local network. Before trying LinConnect out you should read the warnings that this

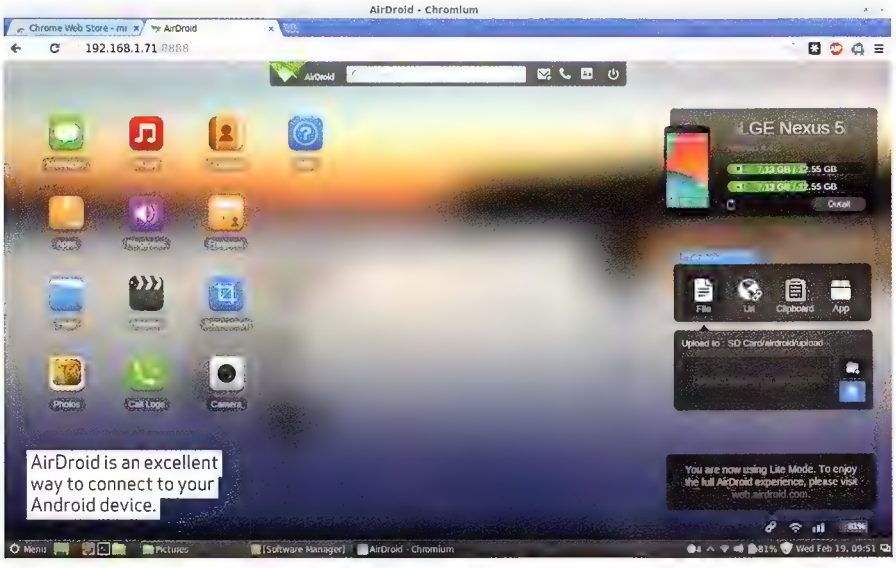
Chromium to text

Send text messages from your desktop.

It's not quite in the same arena as bringing Android notifications to your Linux desktop but there are a host of browser-based services that tie into your various phone services.

One such service we use a lot is Mighty Text. This consists of an Android app (**tinyurl.com/6w5sx56**) and a Chromium browser plug-in, which together enables you to receive and send text messages from Chromium. It's something of a revelation being able to type out and reply to text messages on your desktop. It also suddenly makes texting far more useful. Another advantage is if you receive security messages, as these now appear onscreen rather than on your mobile. Though we do worry about man-in-the-middle attacks — just how secure is it?

Another fantastic little app that's worth a try is Air Droid (**tinyurl.com/8a5bdp2**). This is a more general Android device manager that provides a funky web-based interface within your browser. Just fire up the app and tap the IP address it offers into your browser. Both the phone and desktop have to be on the same local network to work. It provides a virtualised front-end for your phone so you can easily transfer files, access photos and control aspects of it like the camera.



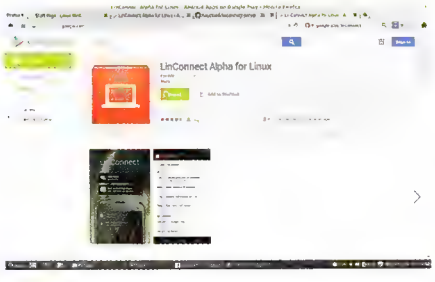
is still alpha software. When we installed the Android app the change log had a number of entries that said a full reinstall would be required and all settings would be lost. So don't expect this to be stable at the moment. The fact it works so well, even at this stage, is a testament to how slick it is on the Android side.

On the Linux server side of things, the installation could still do with a little work. As most of the heavy lifting is done by a somewhat ropey shell script, but it's good enough to get the job done. LinConnect will also install all the required dependencies, install the Python server program and set it up to start automatically each time your system starts. The author has tested the system on Ubuntu and we were running mighty Mint 15 without any major hitches.

At this point, we were using version 2.13, there seems to be little to no customisation on the Linux desktop end of the equation. It'll plug into the default desktop notification system and use that to pass on any Android notifications. Hopefully as this is undergoing some serious development we'll see more abilities to tailor the notifications but it's a start.

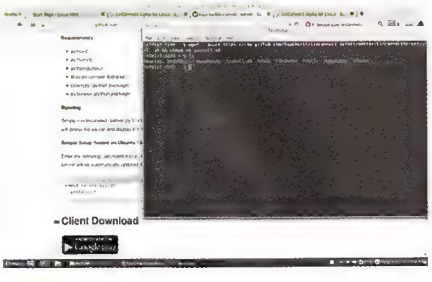
LinConnect up and running

Start getting notifications on your desktop.



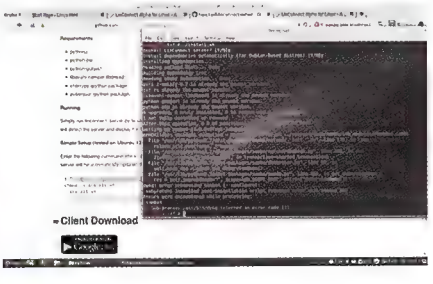
1 GET THE APP

You'll want to head over to the Google Play Store and search for LinConnect (**tinyurl.com/mnbypoz**) then install it on to your chosen Android device. As the app is in alpha it's free. You should also hook up your device to the local network.



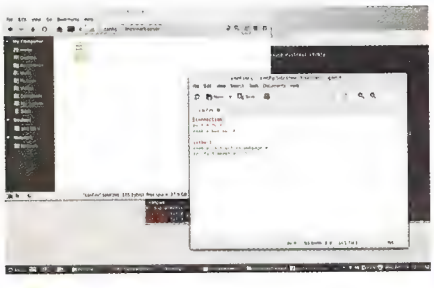
2 GET THE SERVER

You'll need to get the desktop package: `wget --quiet https://raw.github.com/hauckwill/linconnect-server/master/LinConnectServer/ install.sh && chmod +x install.sh`



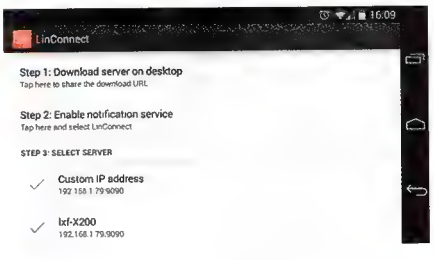
3 REINSTALL OR UPGRADES

If the script encounters any errors, it'll panic and fail, which leaves you having to install dependencies manually. It'll also fail if it encounters the ~/.linconnect folder already exists. So you should `rm -f -r ~/.linconnect` to remove it and make a future reinstall easier.



4 MANUAL DEPENDENCIES

The required Python 2 dependencies are: `sudo apt-get install -y python-pip python-gobject git libavahi-compat-libdnssd1 gir1.2-notify-0.7`. You'll also need `sudo pip install cherrypy pybonjour`. Change the default port via the ~/.config/linconnect-server/conf.ini file.

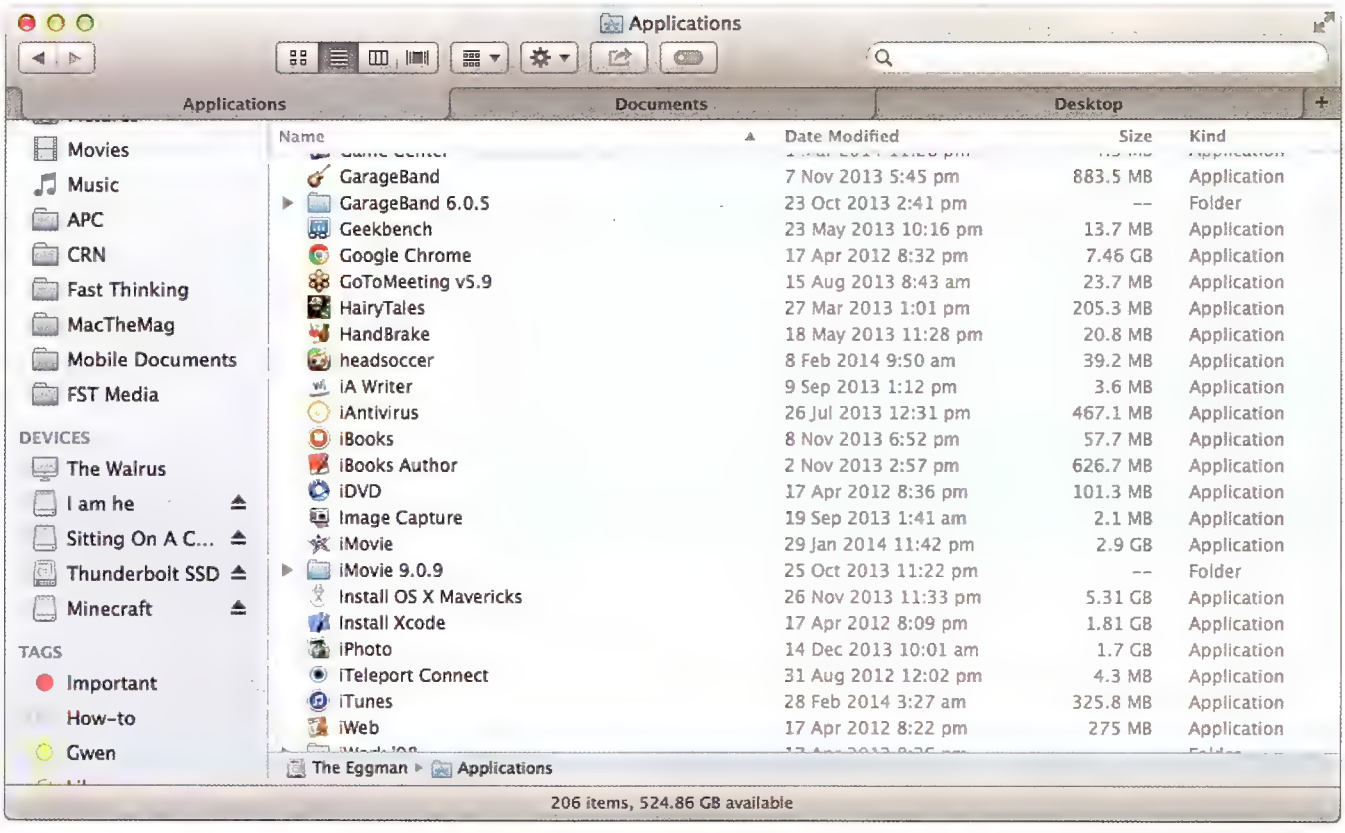


5 GET LINCONNECTED

Back on your device you'll need to connect LinConnect to your new LinConnect server. First enable the app to capture notifications from Android. Next select the server your device should connect to, you're able to enter a manual IP and it defaults to port 9090.

6 NOTIFICATION TIME

Once connected you can tap the server entry on the device to fire off a test notification, but otherwise any Android notification will appear on your Linux desktop. In the app, the Enable applications option enables you to add and remove apps from notifications.


Applications
Applications
Documents
Desktop
Movies
Music
APC
CRN
Fast Thinking
MacTheMag
Mobile Documents
FST Media
DEVICES
The Walrus
I am he
Sitting On A C...
Thunderbolt SSD
Minecraft
TAGS
Important
How-to
Gwen
Name
Date Modified
Size
Kind
GarageBand 7 Nov 2013 5:45 pm 883.5 MB Application
GarageBand 6.0.5 23 Oct 2013 2:41 pm -- Folder
Geekbench 23 May 2013 10:16 pm 13.7 MB Application
Google Chrome 17 Apr 2012 8:32 pm 7.46 GB Application
GoToMeeting v5.9 15 Aug 2013 8:43 am 23.7 MB Application
HairyTales 27 Mar 2013 1:01 pm 205.3 MB Application
HandBrake 18 May 2013 11:28 pm 20.8 MB Application
headsoccer 8 Feb 2014 9:50 am 39.2 MB Application
iA Writer 9 Sep 2013 1:12 pm 3.6 MB Application
iAntivirus 26 Jul 2013 12:31 pm 467.1 MB Application
iBooks 8 Nov 2013 6:52 pm 57.7 MB Application
iBooks Author 2 Nov 2013 2:57 pm 626.7 MB Application
iDVD 17 Apr 2012 8:36 pm 101.3 MB Application
Image Capture 19 Sep 2013 1:41 am 2.1 MB Application
iMovie 29 Jan 2014 11:42 pm 2.9 GB Application
iMovie 9.0.9 25 Oct 2013 11:22 pm -- Folder
Install OS X Mavericks 26 Nov 2013 11:33 pm 5.31 GB Application
Install Xcode 17 Apr 2012 8:09 pm 1.81 GB Application
iPhoto 14 Dec 2013 10:01 am 1.7 GB Application
iTeleport Connect 31 Aug 2012 12:02 pm 4.3 MB Application
iTunes 28 Feb 2014 3:27 am 325.8 MB Application
iWeb 17 Apr 2012 8:22 pm 275 MB Application
The Eggman ▸ Applications
206 items, 524.86 GB available

This Finder window is displaying the Sidebar, the Path Bar, the Status Bar and the Tab Bar.

Make OS X's Sidebar your own

The Sidebar — the bit on the left of any Finder window in OS X — can be a pain or a boon. Matthew JC. Powell shows how to ensure it's the latter.

If you're a reasonably experienced user of Mac OS X, you're probably aware of the Sidebar — the column on the left of a Finder window in which you find shortcuts to devices attached to your Mac, or a few favourite folders. You may even know that you can add things to it by dragging them. What you may not know is that Mavericks changes a lot of the ways the Sidebar works. If you haven't explored using it before, maybe now is the time.

First, make sure you can see it. The Sidebar may not be visible by default when you open a Finder window. In some older versions of Mac OS X, there was an rectangular button on the top of Finder windows that toggled the visibility of the Sidebar, but no-one used it so Apple helpfully removed it. Thanks, Apple.

Now, you toggle the visibility of the Sidebar by pressing Command-Option-S. Alternatively, you can go to the View menu in the Finder, and select Show Sidebar. (If the Sidebar is visible, this obviously changes to Hide Sidebar.) The View menu also allows you to activate other useful Finder window features such as the Path Bar (which displays the path to whatever folder you have open), the Status Bar (which gives a running tally of the free space you have on a given disk) and the Tab Bar (which is visible anyway if you're using Mavericks's Finder Tabs). All of these are useful in their own way, so have a look and decide whether you want them visible.

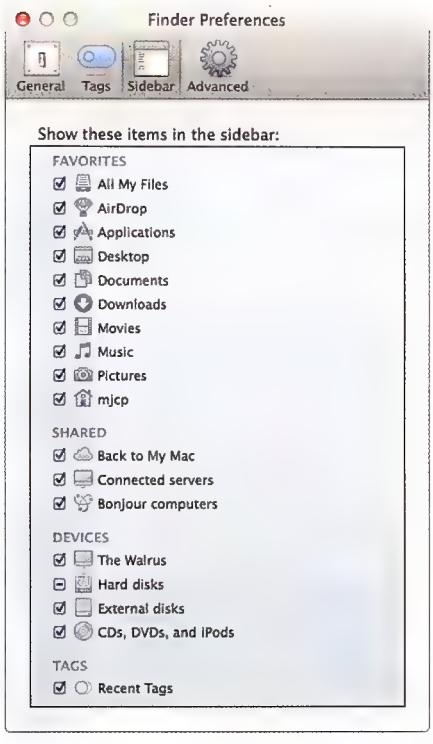
Next, see what you want in it. There are three categories of things that appear in the Sidebar: favourite items; shared locations such as servers; devices; and Tags. The last of these we've discussed in some detail in previous columns, so won't go into here. Shared locations and Devices are fairly self-explanatory, but Favourites perhaps could use a word of explanation.

The Favourites section of the Sidebar can contain any item — a folder, a file, even an application — that you want to have quick access to at any time. Obviously it replicates in part the function of the Dock in that regard, but being accessible in any Finder window, located wherever you want on screen, can be a time saver.

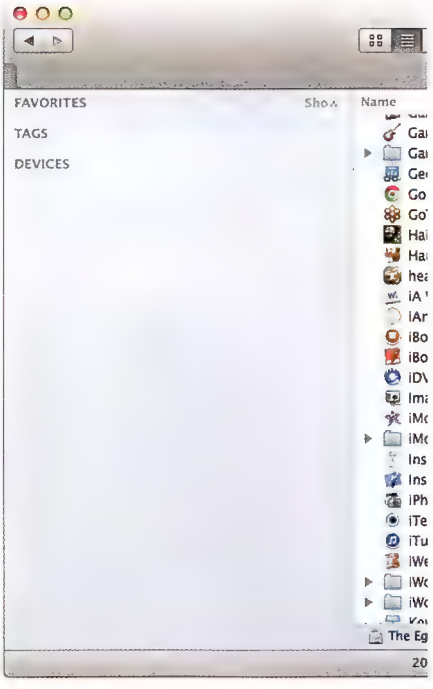
By default, the following Favourites are visible when you open the Sidebar: All My Files; AirDrop; Applications; Desktop; Documents; Downloads; Movies; Music; Pictures; and your user folder. Obviously there's duplication here — most of those folders are located inside your user folder, so you might not want to have shortcuts to both. Apple seems to have erred on the side of over-catering in this case.

To cut down what appears there, go to the Finder menu and select Preferences, then click on the Sidebar tab. You'll see a checklist of all of the items that can appear in the Sidebar by default. Simply uncheck the ones you don't need to have there — if you never use AirDrop, for example, there's no need to have it take up screen real estate. Likewise, most users rarely have need to look at the top-down view of their computer, so remove your computer from the Devices section to save a bit of space. Don't worry, that doesn't affect your access to it in any way.

Then, add stuff to it. Now that the



In Finder Preferences, you can decide which items you want to have appear in the Finder Sidebar — have as much or as little as you want, but remember that a crowded Sidebar is an inefficient Sidebar.



For a distraction-free yet still powerful Sidebar, hide sections and reveal them as required. It's still faster than hunting your hard drive for the things you need.

defaults are how you want them, it's time to start adding own to make the Sidebar your own. Adding a favourite folder is easy: simply drag it onto the Sidebar. A line appears indicating where it will be positioned; when you're ready, just let go. You can always move it later.

Adding files (such as an oft-used spreadsheet) or applications is a little bit harder, or at least it is now. Prior to Mavericks, you just dragged and dropped as with folders. Apple wants to discourage that, it seems. Now, you select the item you want to put in the Sidebar, then go to the File menu and select 'Add To Sidebar' (or press Command-Control-T). That command also works with Folders, but it's the only way to add anything else.

How you remove things from the Sidebar depends on the type of thing it is. With folders or other items you've added yourself, simply click and hold on the item, then drag it off the Sidebar and let go — it disappears in a puff of smoke. If it's something that OS X put there — such as one of the default folders, or an attached disk — that won't work. You have to right-click on it and select Remove From Sidebar from the contextual menu. Note that removing a device this way does not eject it — just makes it not visible in the Sidebar.

Also, note that the same contextual menu includes an option to 'Add To Dock' — so if you decide the Dock is a better place for that oft-used spreadsheet, you can move it in one swift stroke.

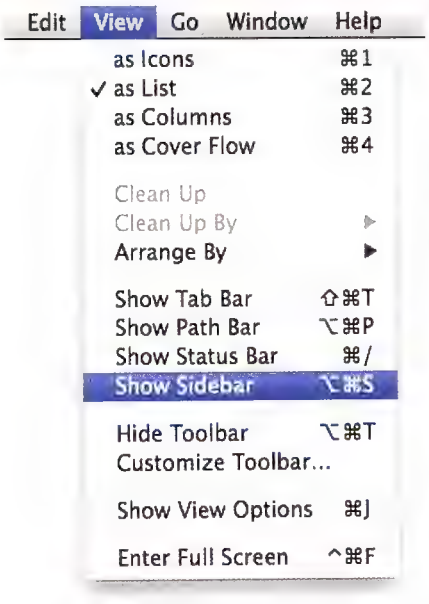
Now, arrange it just so. Using the 'Add To Sidebar' command places things at the bottom of the Favourites section. If you want your oft-used spreadsheet at the top of the section, it's a simple matter of dragging and dropping.

You can also move sections this way. So if you feel that Tags are more essential to your workflow than a list of devices, click on the Tags heading and drag it up. It's your Sidebar — do what you want!

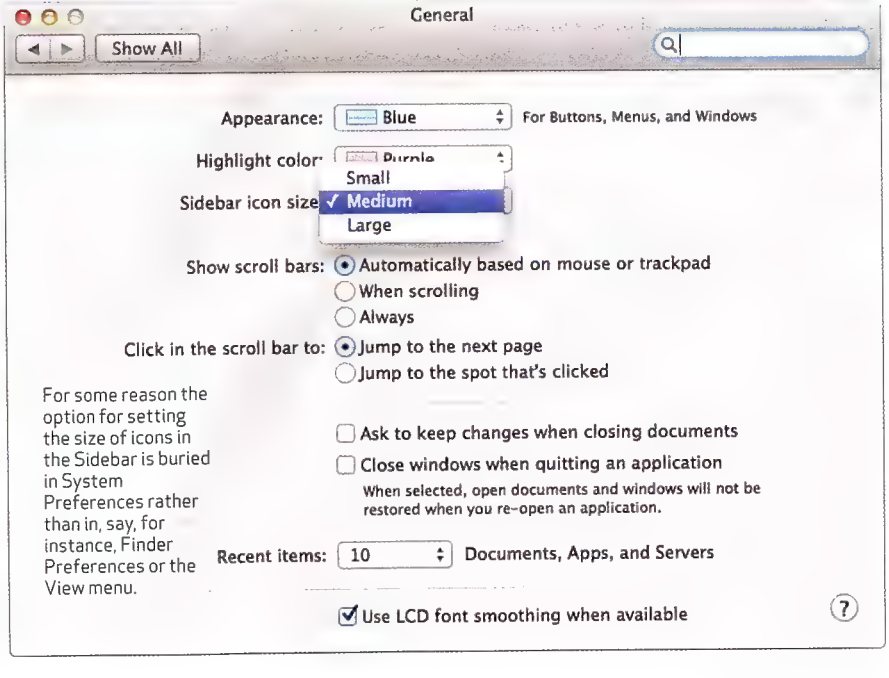
The sharp-eyed might notice that when you mouse over one of the section headings, the word Hide appears to the right of the heading. If you want a really neat Sidebar, you can hide the sections and only reveal them when you need them.

Finally, right-size it. You many have noticed that it's a little annoying that some preferences for how the Sidebar looks are in the View menu and some are in the Finder Preferences. Well, you'll love this. You can make the icons in the Sidebar appear larger or smaller, depending on the display you've got and the quality of your eyes. But to do so you'll have to go to yet a third place.

Open System Preferences and click on the General pane. Once there, you'll see a pull-down menu for Sidebar Icon Size. You only have three options, but they update on the fly. Select each one with a Finder window open and decide what's going to suit you best.



The Finder's View menu contains a number of options for how much information a Finder window gives you by default.


General
Show All
Appearance: Blue For Buttons, Menus, and Windows
Highlight color:
Sidebar icon size: Small ✓ Medium Large
Show scroll bars: Automatically based on mouse or trackpad
When scrolling
Always
Click in the scroll bar to: Jump to the next page
Jump to the spot that's clicked
For some reason the option for setting the size of icons in the Sidebar is buried in System Preferences rather than in, say, for instance, Finder Preferences or the View menu.
Ask to keep changes when closing documents
Close windows when quitting an application
When selected, open documents and windows will not be restored when you re-open an application.
Recent items: 10 Documents, Apps, and Servers
Use LCD font smoothing when available

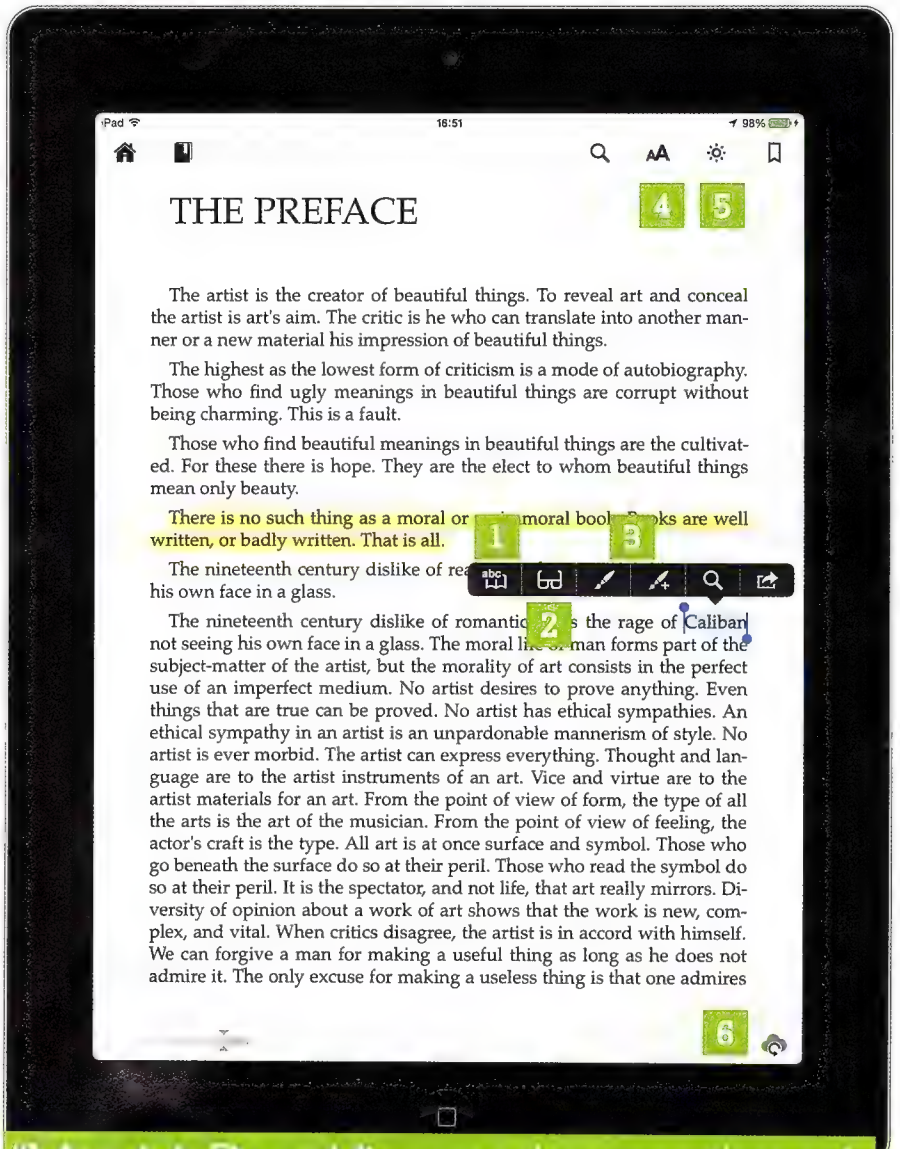
Better e-reading on iOS

Get the most from your books with Marvin.

There are lots of great ebook readers for the iPad, including Apple's very own iBooks. Where Marvin stands head and shoulders above the others is the level of attention to detail.

Most ebook readers are content to just enable you to highlight text and maybe search the dictionary. Not Marvin; this also has a mode called Deep View that scans through a book to find characters, places, names and other recurring details. You can then use this to quickly find any character in the book (handy if you forget who somebody is); and you can get a summary of the book. It also integrates nicely with Wikipedia and other sources to provide information about a book.

It also has some of the best formatting options of any ebook reader. Whereas most are content to offer you text size, a few fonts and maybe a choice of backgrounds, Marvin enables you to change margins, column layout, themes and gestures. It's range of options make it a breathtaking ebook reader.


iPad
16:51
98%
THE PREFACE
4
5
The artist is the creator of beautiful things. To reveal art and conceal the artist is art's aim. The critic is he who can translate into another manner or a new material his impression of beautiful things.
The highest as the lowest form of criticism is a mode of autobiography. Those who find ugly meanings in beautiful things are corrupt without being charming. This is a fault.
Those who find beautiful meanings in beautiful things are the cultivated. For these there is hope. They are the elect to whom beautiful things mean only beauty.
There is no such thing as a moral or
moral book
ks are well written, or badly written. That is all.
1
3
The nineteenth century dislike of rea
his own face in a glass.
The nineteenth century dislike of romantic
s the rage of Caliban
2
not seeing his own face in a glass. The moral li
man forms part of the subject-matter of the artist, but the morality of art consists in the perfect use of an imperfect medium. No artist desires to prove anything. Even things that are true can be proved. No artist has ethical sympathies. An ethical sympathy in an artist is an unpardonable mannerism of style. No artist is ever morbid. The artist can express everything. Thought and language are to the artist instruments of an art. Vice and virtue are to the artist materials for an art. From the point of view of form, the type of all the arts is the art of the musician. From the point of view of feeling, the actor's craft is the type. All art is at once surface and symbol. Those who go beneath the surface do so at their peril. Those who read the symbol do so at their peril. It is the spectator, and not life, that art really mirrors. Diversity of opinion about a work of art shows that the work is new, complex, and vital. When critics disagree, the artist is in accord with himself. We can forgive a man for making a useful thing as long as he does not admire it. The only excuse for making a useless thing is that one admires
6

"Marvin's Deep View mode scans through a book to find recurring details for you."

Visual guide | Reading with Marvin

How to make the most of what Marvin has to offer...

1 DEFINITION
To get a definition of a word, tap on it, choose Manage and tap the iCloud button next to the dictionary you want to use. You can use English (Oxford Dictionary) or the Apple Dictionary. You can also tap Search Web to switch to Safari and search for the word.

2 DEEP VIEW
Deep View is a mode which Marvin uses to scan through a book for characters, places and other recurring information. It also enables you to add Wikipedia articles and create a separate summary of characters in the book.

3 HIGHLIGHT
You can highlight text and add notes to highlights using these two buttons. You can then go on to share your notes using social media or email along with copy from the book.

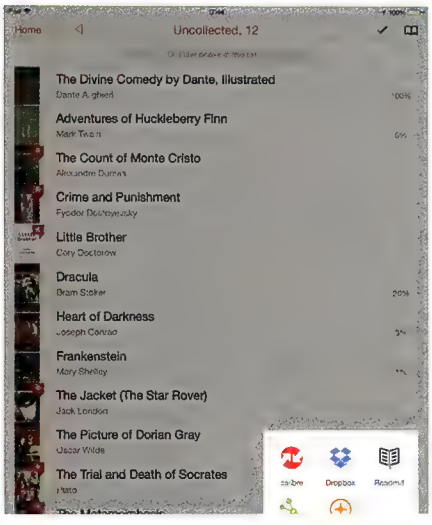
4 FORMATTING
Marvin has incredibly detailed formatting options. As well as being able to adjust the font and size of text, you can adjust margins, columns, themes and gestures. Tap the AA icon to make changes.

5 BRIGHTNESS AND DIMMING
You can adjust the brightness of a book by tapping this icon (or by sliding your finger up and down the display). Tapping this icon also reveals sliders for Warmth and Contrast, enabling you to fine-tune the display to your own preferences.

6 BOOK NAVIGATION
Books are navigated by tapping on the left or right hand of the screen. You can also use the navigation slider at the bottom to move to different chapters in the book and tap the Sync button in the bottom right corner.

Reading books in Marvin

Customise your reading experience to suit your own tastes.



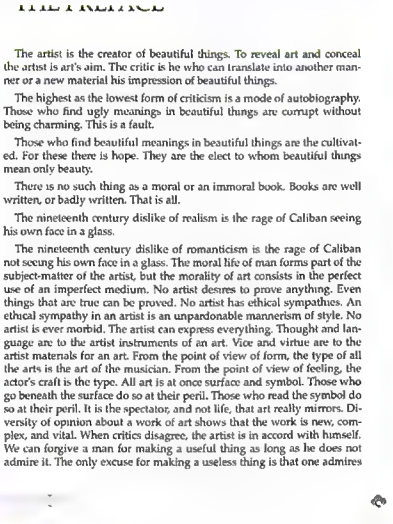
1 ADD BOOKS TO MARVIN

Open the Marvin app and tap 'Get Books' in the bottom right for import options. You can tap on OPDS to get free books online. Tap on Project Gutenberg, Popular and tap on a book and Yes to download it to the Library. Project Gutenberg has most classic books. If you have any books as epub files you can add them using Dropbox or by using the File Transfer section of iTunes. You can also tap Get Books and Web to browse/download files online.

Book
The Picture of Dorian Gray by Oscar Wilde
Get articles about the book
Get articles about the author
Pin more articles

4 GET RELATED ARTICLES

You can also insert online articles. Tap on Deep View and Articles and 'Get Articles About The Book'. Marvin will look online for related articles. Tap the ones you want to add. Now tap on 'Get Articles About the Author' and go through the same process. Finally, tap on 'Pin More Articles', to search online for articles about the book. When you are looking at a web page, you can attach it to the book by tapping the Pin icon in the top right of the screen.



The artist is the creator of beautiful things. To reveal art and conceal the artist is art's aim. The critic is he who can translate into another manner or a new material his impression of beautiful things.

The highest as the lowest form of criticism is a mode of autobiography. Those who find ugly meanings in beautiful things are corrupt without being charming. This is a fault.

Those who find beautiful meanings in beautiful things are the cultivated. For these there is hope. They are the elect to whom beautiful things mean only beauty.

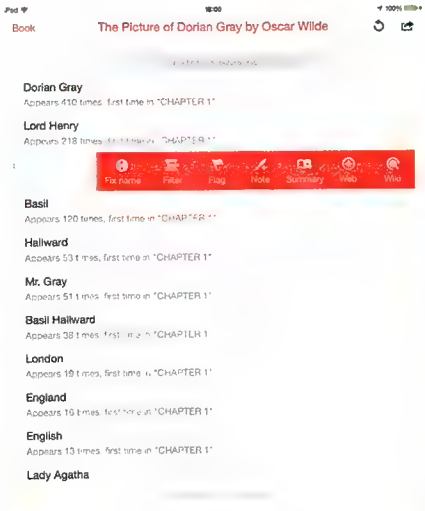
There is no such thing as a moral or an immoral book. Books are well written, or badly written. That is all.

The nineteenth century dislike of realism is the rage of Caliban seeing his own face in a glass.

The nineteenth century dislike of romanticism is the rage of Caliban not seeing his own face in a glass. The moral life of man forms part of the subject-matter of the artist, but the morality of art consists in the perfect use of an imperfect medium. No artist desires to prove anything. Even things that are true can be proved. No artist has ethical sympathies. An ethical sympathy in an artist is an unpardonable mannerism of style. No artist is ever morbid. The artist can express everything. Thought and language are to the artist instruments of an art. Vice and virtue are to the artist materials for an art. From the point of view of form, the type of all the arts is the art of the musician. From the point of view of feeling, the actor's craft is the type. All art is at once surface and symbol. Those who go beneath the surface do so at their peril. Those who read the symbol do so at their peril. It is the spectator, and not life, that art really mirrors. Diversity of opinion about a work of art shows that the work is new, complex, and vital. When critics disagree, the artist is in accord with himself. We can forgive a man for making a useful thing as long as he does not admire it. The only excuse for making a useless thing is that one admires

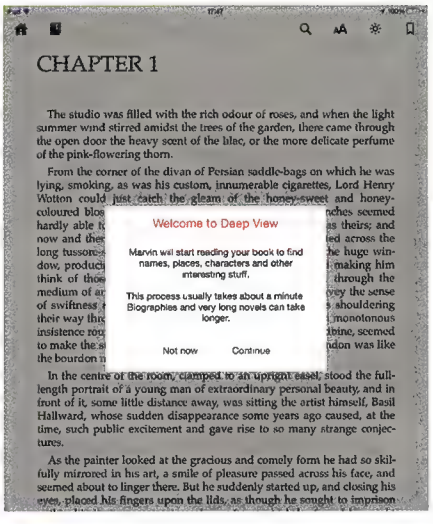
2 READING A BOOK

Tap on a book in the Library. Basic reading works much the same as in iBooks or the Kindle app. Tap on the right side to move to the next page, and the left to move back a page. Tap the centre of the display to bring up the on-screen controls, and tap and hold on a word to highlight it and bring up options. You can use the Navigation slider at the bottom to move between chapters, and tap the Cloud Sync icon to sync your page position across devices.



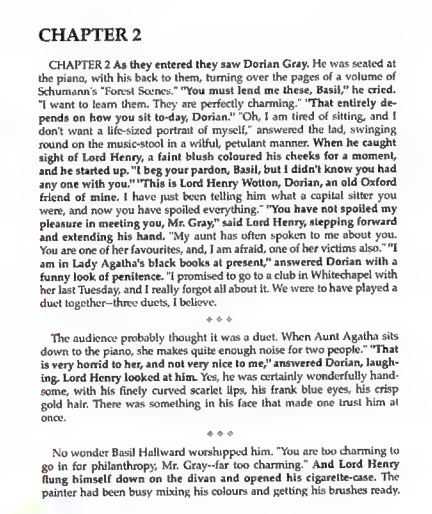
5 BUILD A SUMMARY

You can also build a Summary related to your book. Tap on Deep View and Names. Slide left across a name and tap Summary to add it to the summary list. Now tap Summary and Build It. You can choose a Summary size by using the different Add ("+", "++", or "+++") icons. Tap one and Marvin will scan the book for paragraphs with those names in it; and Marvin builds a new ebook based on just those names. Tap on 'Yes, Add It' to save the book to your library.


CHAPTER 1
Welcome to Deep View
Marvin will start reading your book to find names, places, characters and other interesting stuff.
This process usually takes about a minute
Biographies and very long novels can take longer.
Not now
Continue

3 STARTING DEEP VIEW

Deep View is the feature that separates Marvin from other book reading apps. Tap Deep View (icon is a pair of glasses) and tap Continue. Marvin will now scan through the book and bring up a list of characters. You should first merge popular characters that Marvin has under different names (Dorian, Mr Gray, and Dorian Gray in our book). Slide your finger left across a name to and tap on 'Fix Name and Merge With'. Now tap on other names to merge them.



CHAPTER 2

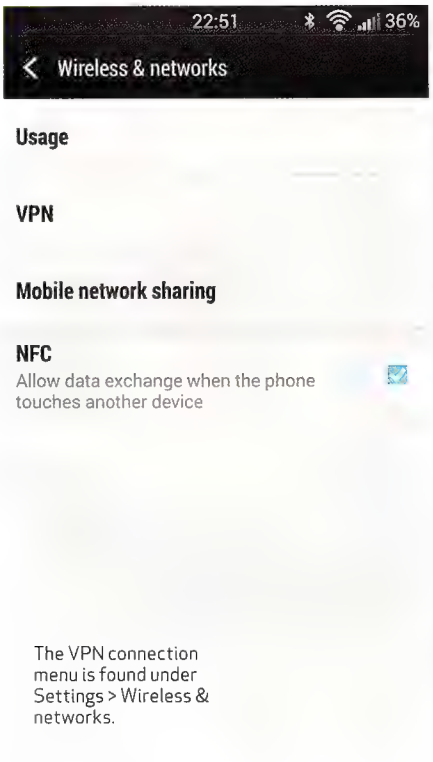
CHAPTER 2 **As they entered they saw Dorian Gray.** He was seated at the piano, with his back to them, turning over the pages of a volume of Schumann's "Forest Scenes." **"You must lend me these, Basil," he cried.** "I want to learn them. They are perfectly charming." **"That entirely depends on how you sit to-day, Dorian."** "Oh, I am tired of sitting, and I don't want a life-sized portrait of myself," answered the lad, swinging round on the music-stool in a wilful, petulant manner. **When he caught sight of Lord Henry, a faint blush coloured his cheeks for a moment, and he started up. "I beg your pardon, Basil, but I didn't know you had any one with you." "This is Lord Henry Wotton, Dorian, an old Oxford friend of mine.** I have just been telling him what a capital sitter you were, and now you have spoiled everything." **"You have not spoiled my pleasure in meeting you, Mr. Gray," said Lord Henry, stepping forward and extending his hand.** "My aunt has often spoken to me about you. You are one of her favourites, and, I am afraid, one of her victims also." **"I am in Lady Agatha's black books at present," answered Dorian with a funny look of penitence.** "I promised to go to a club in Whitechapel with her last Tuesday, and I really forgot all about it. We were to have played a duet together—three duets, I believe.

The audience probably thought it was a duet. When Aunt Agatha sits down to the piano, she makes quite enough noise for two people. **"That is very horrid to her, and not very nice to me," answered Dorian, laughing. Lord Henry looked at him.** Yes, he was certainly wonderfully handsome, with his finely curved scarlet lips, his frank blue eyes, his crisp gold hair. There was something in his face that made one trust him at once.

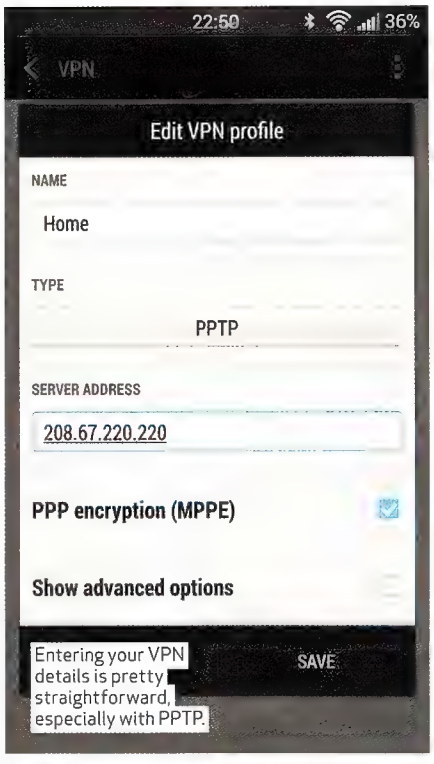
No wonder Basil Hallward worshipped him. "You are too charming to go in for philanthropy, Mr. Gray—far too charming." **And Lord Henry flung himself down on the divan and opened his cigarette-case.** The painter had been busy mixing his colours and getting his brushes ready.

6 VIEWING THE SUMMARY

Tap the Home icon in the top left to return to your library. You should now see a new book at the top called Summary For [name of your book]. Tap this and a new book will open. This has the chapters from your original book, but instead of having every paragraph it will only contain paragraphs containing the names you chose to add to the Summary. You can now read this Summary, and add notes to it. This is a great way to get an overview of a book.



The VPN connection menu is found under Settings > Wireless & networks.



Entering your VPN details is pretty straightforward, especially with PPTP.

OpenVPN offers a handy app to connect to your OpenVPN server.

Browse securely on your Android phone

Encrypt your web traffic, even on an open Wi-Fi network, with Simon Chester.

The tin hatters in the audience will already be aware that organised crime syndicates run internet cafés and open Wi-Fi hotspots as ways to scrape user information and passwords. It's hard to know if this is true or not, but the monetary incentive for people to 'listen in' on public Wi-Fi networks can't be denied. So, if you find yourself needing to use a public Wi-Fi access point, it makes sense to take the time to encrypt any data travelling across said network, keeping it from any eavesdroppers – real or imagined.

Follow on to learn about two methods that allow you to achieve this on your Android device.

VIRTUAL PRIVATE NETWORK (VPN)

By creating a VPN, you can make your Android device work as if it's connected to your home Wi-Fi network – including using its internet connection, and accessing all the services, printers, and shared files that are available on the network – while encrypting all traffic between the device and the VPN server.

It's worth noting, though, that the download speeds on your device will be limited to the upload speed of your home internet connection – which is pitifully slow on ADSL connections.

You can set up a VPN server in one of two places: either on your router (most don't support this, however), or on an always-on computer. To connect, you'll also require a static IP address or a service like DynDNS.

Setting up a highly secure IPSec VPN connection on your router is a notoriously difficult task plagued with compatibility problems – I just couldn't get it to work between my Billion router and my phone. In the end, you may need to opt for the less-secure (but infinitely easier to set up) PPTP. Thankfully, if you choose a strong password (a cinch if you use a password manager like KeePass), PPTP is secure enough for your needs. Setting this up on your router is beyond the scope of this article, though, so consult your manual for more info.

Android natively supports both IPSec and PPTP, and setting them up on your Android device is just a matter of heading to the 'Wireless & networks' menu in system settings, then choosing VPN, and 'Add VPN Profile'. You just need to enter your home IP address and the connection details, then click connect. If you want to make sure that your VPN is always used, choose 'Always on VPN' from the menu.

If your router doesn't support an in-built VPN server, then you need to install one on an always-on PC. I recommend using OpenVPN as it's broadly compatible, and has both

Third-party VPNs

Like with SSH tunnelling through your web host, there are many third-party VPN providers out there that can provide you with an encrypted connection. For instance, TunnelBear comes with an Android and iOS app, and even allows you to choose the country you want to appear to be from — giving you access to foreign streaming services to boot. These are faster, but, obviously, you won't get access to your home network.

Setting up remote SSH

To gain remote SSH access to your home computer, you'll need to forward a random port number from your router to port 22 on your computer. I'd also recommend setting up public key authentication and disabling password-only authentication and remote root account access. Some background knowledge is required, but a sample workflow is available at **tinyurl.com/o2kf8pu**.

Android and iOS apps for smooth set up on your mobile device. Setting it up on your PC is, again, beyond the scope of this article, but you can learn more, including a setup guide, at: **xtinyurl.com/o9zos5**.

While there are benefits to running your own VPN, it can be complicated and difficult. There is an alternative:

SSH TUNNELLING

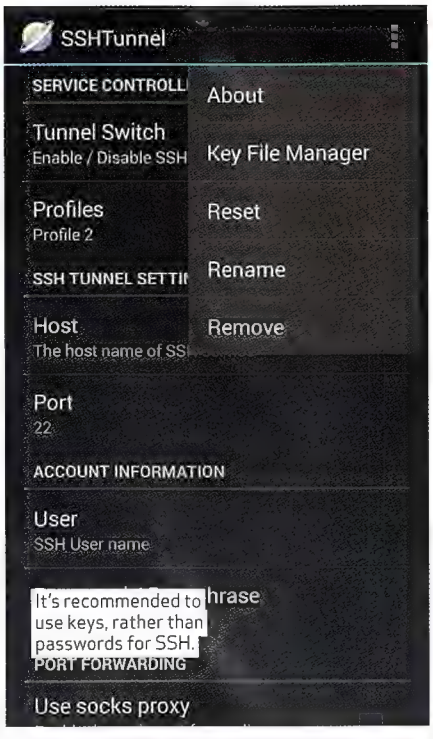
Secure Shell (SSH) is a cryptographic network protocol that allows secure, remote command execution and communication between two computers. If you have an always-on Linux box, you've doubtless already used SSH to manage it, but you can also set up SSH on Windows through PuTTY or Cygwin. In addition to sending commands, you can use the tunnelling feature of SSH to send almost anything through that secure channel – including an internet connection.

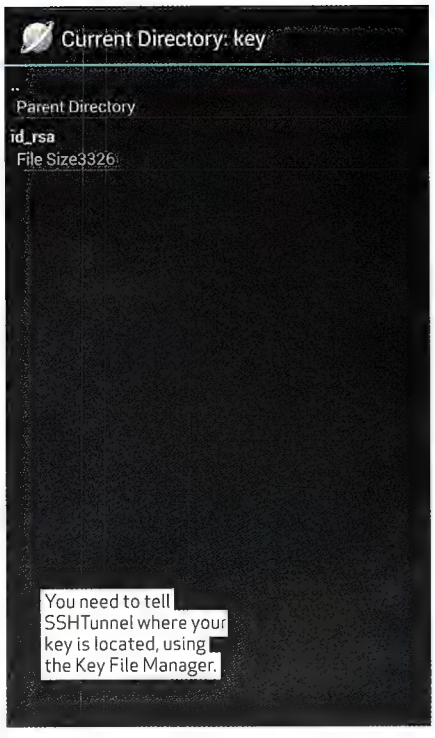
SSH tunnelling on Android requires a rooted handset, but doesn't require any extra mojo on the server beyond locking down SSH for remote access. If the server is on an ADSL connection, it will suffer the same speed problems as VPN.

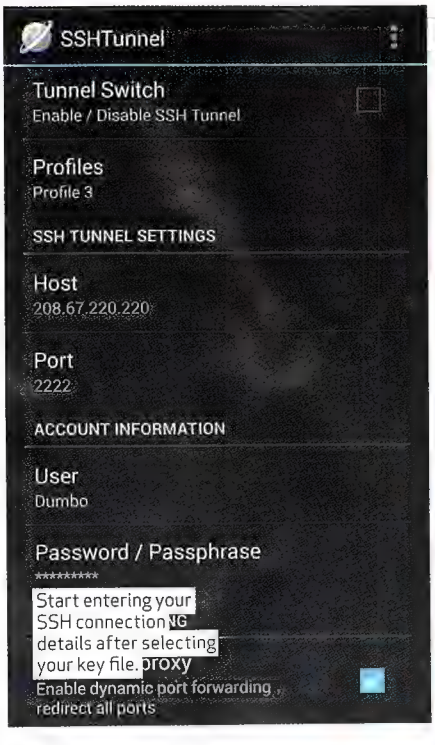
You can actually bypass the speed and security issues entirely by paying for a web host that offers SSH connectivity and tunnelling (via SOCKS). If you don't already use a web host, you should consider one, as they don't cost very much, and the SSH tunnel justifies the cost. SSH isn't a standard feature, however, so make sure that your web host not only offers it, but is comfortable with you using it as a tunnel.

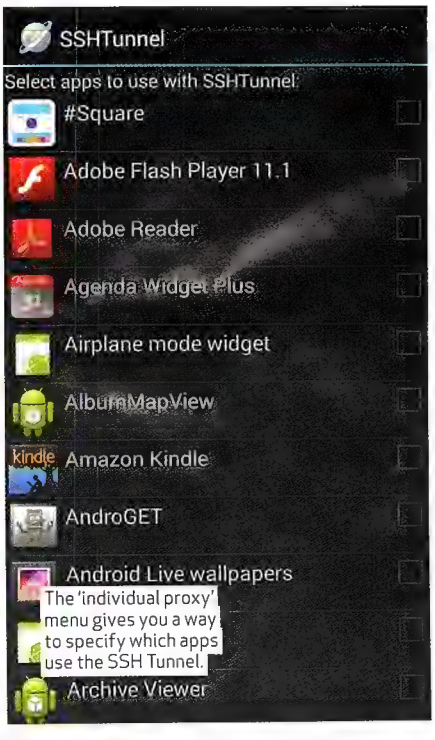
Also, tunnelling will make your traffic look as though it's coming from your web-host, so web sites and streaming services will think that you're browsing from your web host's country – handy for streaming Hulu, not so much if you need to access something Australian.

To set up SSH tunnelling on your Android device, download the free SSH Tunnel app by Max Lv from the Play Store.




Current Directory: key
..
Parent Directory
id_rsa
File Size3326
You need to tell SSHTunnel where your key is located, using the Key File Manager.





Before flicking the 'Tunnel Switch', you first need to enter your connection details, starting with the IP address of the SSH server (under Host), and the port you will access it from. If you're using public key authorisation (you should be), place your private key in /sdcard/sshtunnel and press the three-dot menu and choose the 'Key File Manager' and then navigate to and select your OpenSSH key.

Next, enter your username and password/key passphrase, and select the 'Use socks proxy' and 'Global proxy' options so that all apps and all data on your phone are routed through SSH. If an app plays up, choose 'Individual proxy' and remove it from the list.

That's it! Now you just need to scroll back up to the top of the page, enable the connection and grant Super User access. To check if it worked, type in 'what is my IP address' into Google, and make sure that your IP address matches that of the server you connected to.

Display information upfront with an Excel splash screen

Helen Bradley shows how to create an interactive splash screen for your Excel worksheets.

When you need to provide important information to a user before they start working with an Excel worksheet you can do so with a splash screen. Here's how to create one which can be made to disappear when no longer required.

HOW IT WORKS

You can create a splash screen as a VBA userform which appears as the workbook opens. You can display a variety of information on the splash screen and ours will include a navigation button to take the user to a particular sheet. It will also allow the user to disable the splash screen if no longer required.

There are a couple of things to consider with this project, one is that the macro must run automatically when the workbook is opened and the solution is to call the macro Auto_Open – this is a special macro that Excel runs on opening a file. The second issue is being able to write a file to disk – in Windows Vista, 7 & 8 many folders cannot be accessed using VBA code and to write to others you have to know the current user's username. We will use a special function that lets us access the location of the user's My Documents folder without knowing their user name.

CREATE THE SOLUTION

With the workbook open, first name one of the sheets Help as this is used by one of the form buttons. Then follow step 1 to set up your splash screen – add any information you want the user to see to that form.

In the VBA Editor choose 'Insert > Module' and add this code to the module, it will automatically display the form when the worksheet is opened:

```
Sub auto_open()
If Dir(CreateObject("WScript.
Shell").
SpecialFolders("MyDocuments")
& "\splashscreendisabled.txt")
= "" Then
   UserForm1.Show
End If
End Sub
```

This is the code that is attached to the form in Step 2:

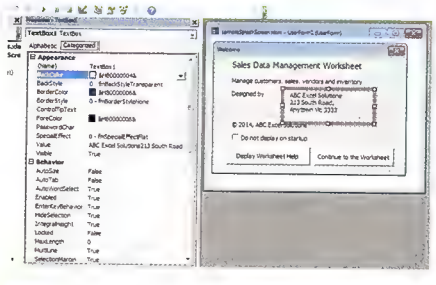
```
Private Sub CommandButton1_
Click()
    Sheets("Help").Select
    Unload Me
End Sub

Private Sub CommandButton2_
Click()
If CheckBox1.Value Then
Open CreateObject("WScript.
Shell").
SpecialFolders("MyDocuments")
& "\splashscreendisabled.txt"
For Output As #1
    Close #1
End If
    Unload Me
End Sub

Private Sub UserForm_
Initialize()
If Dir(CreateObject("WScript.
Shell").
SpecialFolders("MyDocuments")
& "\splashscreendisabled.txt")
<> "" Then
        CheckBox1.Value = True
    End If
End Sub
```

Get it

Download the macro file for this article from **www.apcmag.com/magstuff**

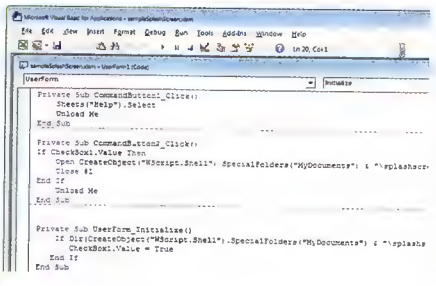
Create a splash

Display a message for your users.



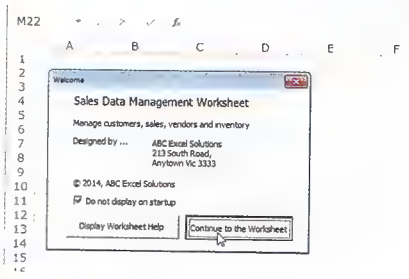
1 CREATE THE SCREEN

Open the Visual Basic Editor and choose 'Insert > UserForm' and create your splash screen. Ours includes a CheckBox that we can use to disable it in future, two CommandButtons and various labels and textboxes for displaying content.



2 DISABLE IF NEEDED

Double click the UserForm and add the code set out above to the UserForm1 code panel. This contains code that writes a file to the user's My Documents folder if they opt to disable the form in future. The macro looks for that file when it runs and doesn't display the form if it is present.



3 REBOOT AND YOU'RE DONE

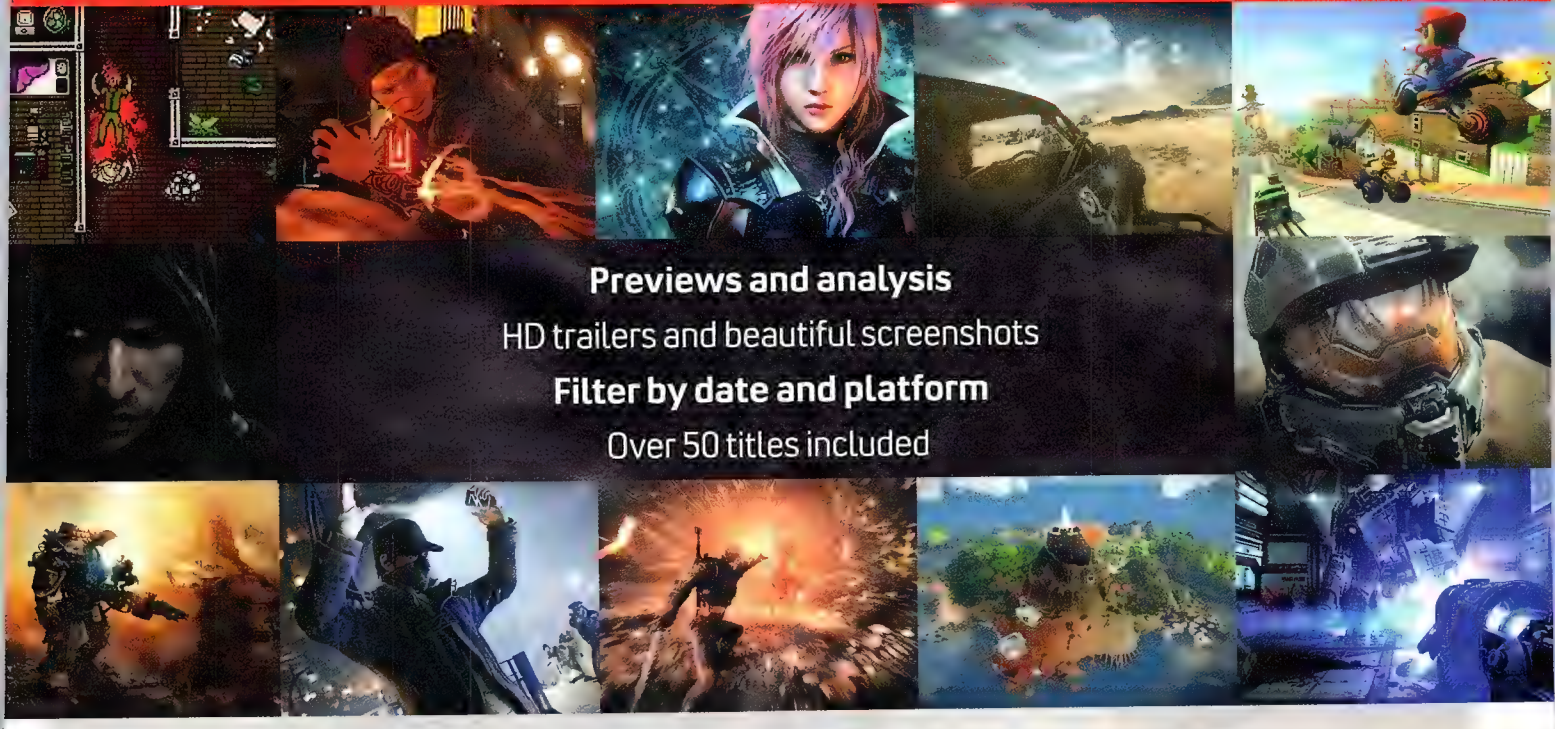
Save the Excel worksheet as an .xlsm macro enabled worksheet file. Close the file, reopen it and the splash screen will appear. You can click to go to the Help worksheet, optionally select to not see the splash screen in future, and you can click to close the dialog.

CVG AUSTRALIA PRESENTS

2014 GAMING GUIDE

ONLY $1.99

DOWNLOAD OUR FULLY INTERACTIVE PREVIEW OF THE BIGGEST GAMES OF THE YEAR!



Previews and analysis

HD trailers and beautiful screenshots

Filter by date and platform

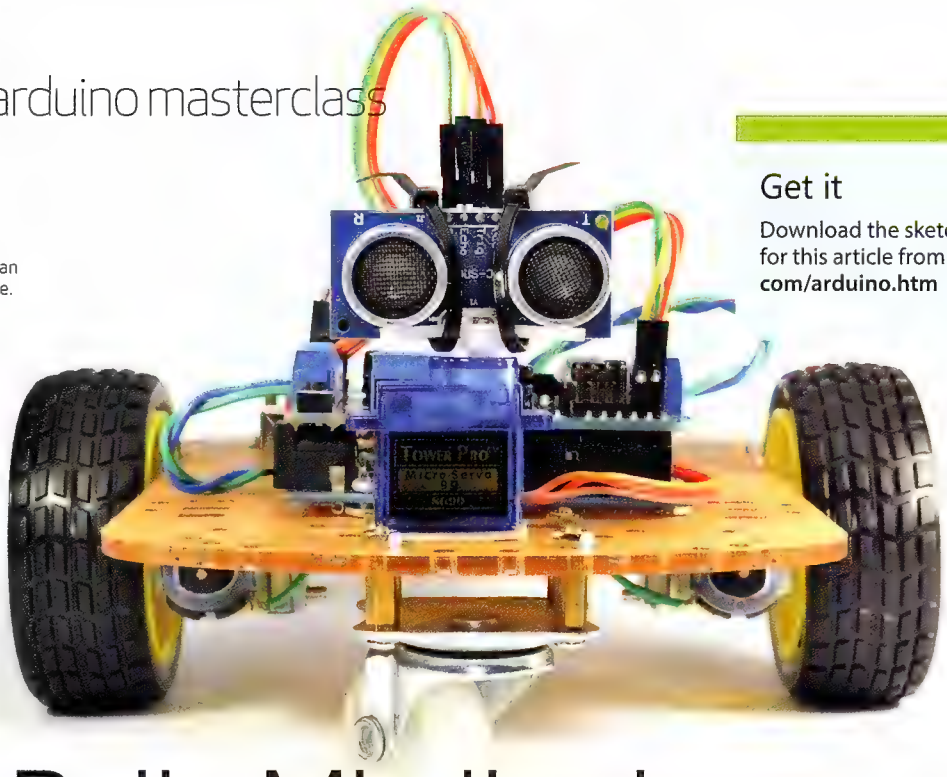
Over 50 titles included

OUT NOW

www.computerandvideogames.com

Available on the App Store

Apple, the Apple logo and iPad are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.



The Rolly Mk. II robot is tougher and sturdier than the original Mk. I release.

Get it

Download the sketch you need for this article from **www.apcmag.com/arduino.htm**

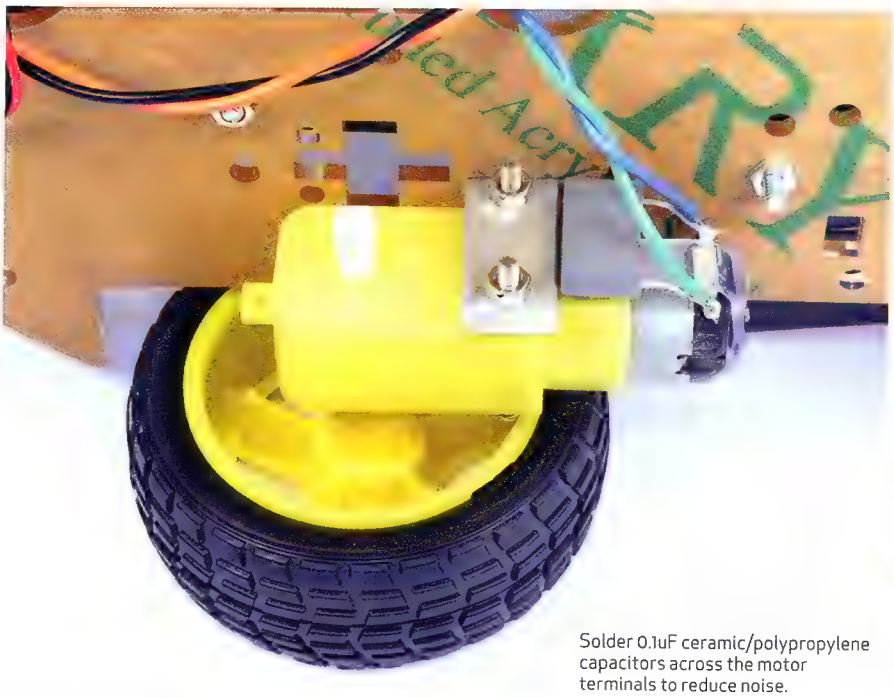
The Rolly Mk. II robot

Darren Yates is back with the Mk. II model of his popular Rolly robot incorporating a new low-cost chassis and software.

Robotics is, and will likely always be, one of the most popular uses for an Arduino microcontroller board. Based on web comments alone, the Rolly Robot from last year has been a hugely popular project in our Arduino masterclass, which is amazing given how low-fi it was, but then, maybe that was part of its charm. It still wanders slowly around my home occasionally, but I have to confess that its days in the sun are numbered – this month, we're building the Rolly Mk.II robot.

NEW CHASSIS

The major new feature this time around is the replacement of the food container lid for a proper acrylic chassis. We spotted a relatively cheap robot chassis kit online some time ago, but recently its price dropped down to just $12 on eBay and we couldn't resist. And for what you get, it's excellent value. For the most part, it includes much of the hardware we scrounged last time for the Mk. I, so the Mk. II not only looks better, it's far more robust and reliable as a result. The kit includes an acrylic chassis, GM3 DC gearbox motors with matching big yellow tyres, front universal castor wheel, all necessary screws and nuts, plus a basic four-AA battery holder. Just search 'robot car chassis' on eBay and you'll find quite a few of them. As for total cost, check out the Parts List and you'll see that, not including batteries, the new Mk. II robot should cost around $50-55 (given the Aussie exchange rate).



Solder 0.1uF ceramic/polypropylene capacitors across the motor terminals to reduce noise.

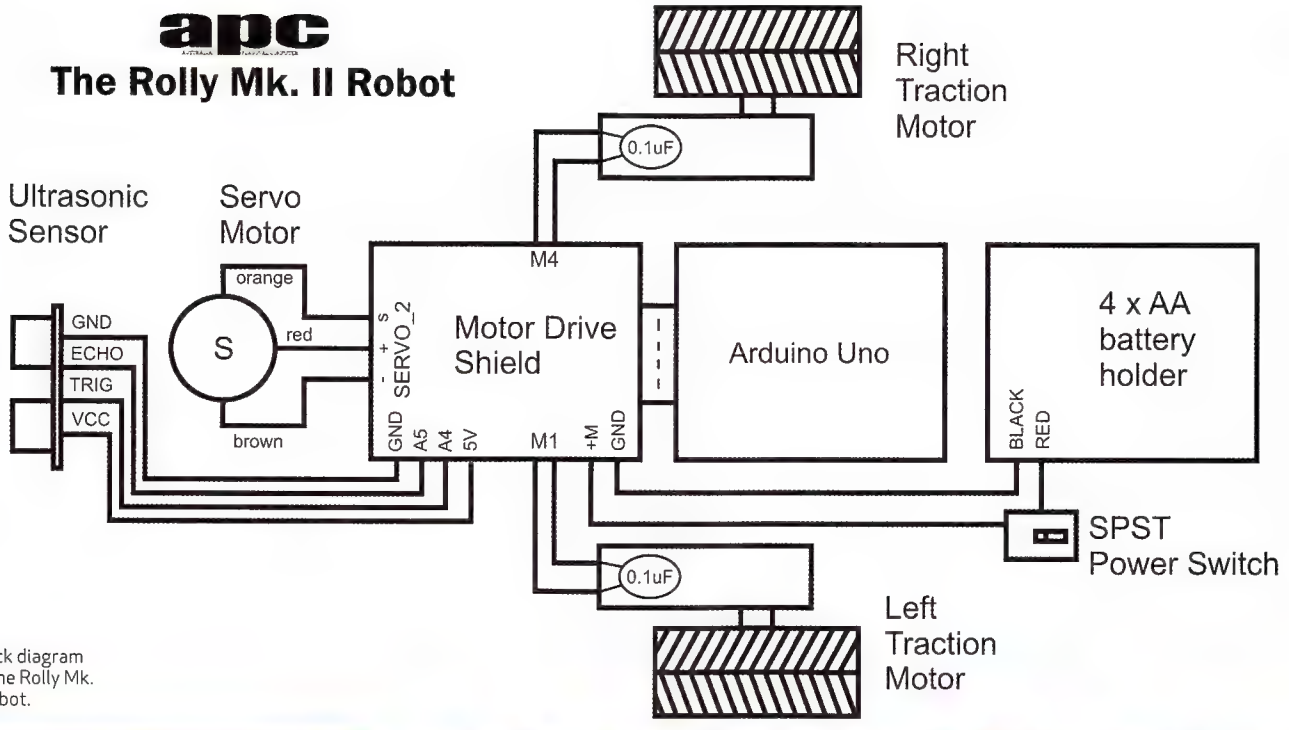
ELECTRONICS

From an electronics viewpoint, there wasn't too much wrong with the Mk. I, so we're using the same design again – an Arduino Uno R3 microcontroller board driving an L293D Motor Drive Shield with a TowerPro SG90 servo motor controlling an HC-SR04 ultrasonic sensor on top. The use of a standard non-switched battery holder means we need a power switch – the simplest option is a standard SPST (single-pole/single-throw) toggle switch in series with the positive battery lead.

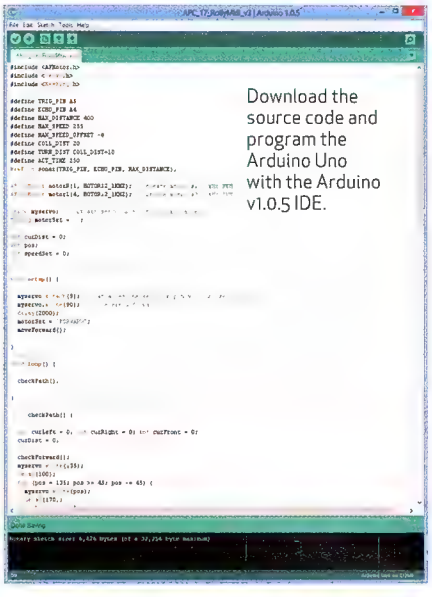
The source code or 'sketch' for the Mk. II has also had an overhaul and refit – it gets rid of some dead wood code plus a number of bugs. As a result, we've been able to crunch the code down from 8.5KB to 6.5KB (leaving you more Arduino flash storage space to play with yourself.) So let's get into it:

STEP 1: BUILD THE CHASSIS

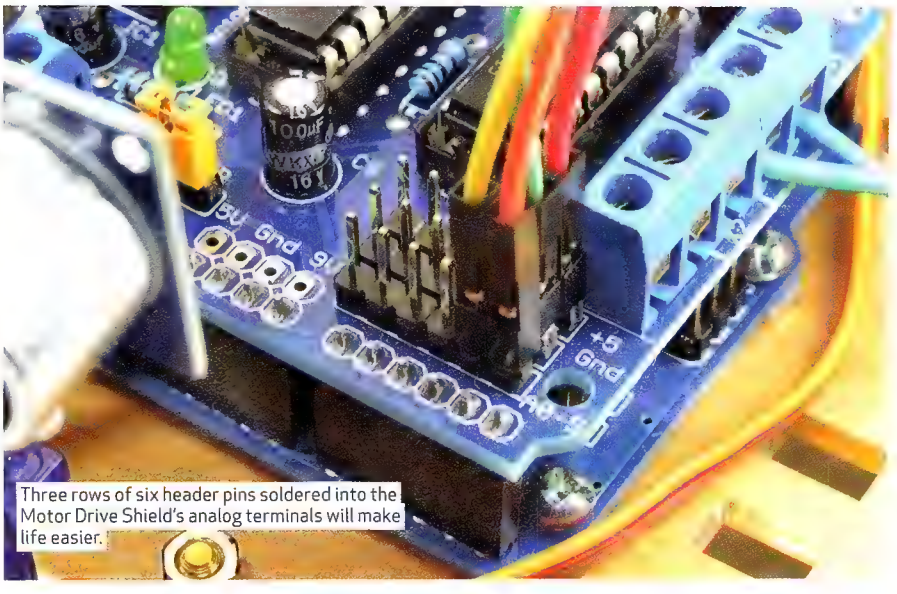
It'll probably come as no surprise that there are no instructions with this chassis, so you'll need to crack open your McGyver skills for a bit of DIY, but really, it's not too difficult. There are



Block diagram of the Rolly Mk. II robot.



Download the source code and program the Arduino Uno with the Arduino v1.0.5 IDE.



Three rows of six header pins soldered into the Motor Drive Shield's analog terminals will make life easier.

two versions of the kit on eBay – the simplest way to tell them apart is one uses brass tapped spacers on the castor wheel; the other doesn't.

What both kits do have in common is some 30mm long M3 machine screws to bolt the steel mounting plate to the GM3 motors. When you mount this, make sure the tiny motor power terminal tabs face the inside – this will help keep your wiring neat. The only other thing with the motor mount is the two holes in the top should line up with the chassis, allowing you to use two of the smaller M3 machine screws supplied to mount it in place.

Now is also probably a good time to point out that the acrylic chassis plate has a protective paper covering on both sides that you can remove – or not. The acrylic chassis itself is transparent – we chose to leave the paper on, one, so we can protect it while we muck around with the design, and two, so you can see it more clearly in the pics. Since you will need to drill at least one hole for the power switch, the paper also helps keep the acrylic from cracking while drilling.

And here's another tip – don't use normal high-speed drill bits when drilling into the acrylic as they can cause cracking. You should be able to find shallow-pitch plastic-cutting drill bits at the local hardware store. Failing that, use a standard drill bit on a slow setting. Acrylic has a habit of melting if you drill too fast and don't lean too heavily on the drill or the acrylic sheet will crack.

We installed the battery holder at what we're calling the 'rear' of the chassis – alongside the driving wheels. Again, use two of the small M3 machine screws down through the top with nuts underneath. The batteries will still happily sit on top of the screws and make contact.

STEP 2: ADD THE ARDUINO UNO R3

At this point, you can either drill a couple of extra holes to add mounting screws on the microcontroller as we did, or you can use double-sided tape. This stuff really sticks, so you won't need to worry about it falling off, even if you have a major stack and roll.

Before adding the Motor Drive Shield, we recommend you solder in some pin headers to the analog input area at the front. Some shields will have these already installed – if not, you can buy them from Jaycar or eBay for a dollar or so. Solder them in carefully and it'll make any future mods much easier. You just need three rows of six pins each.

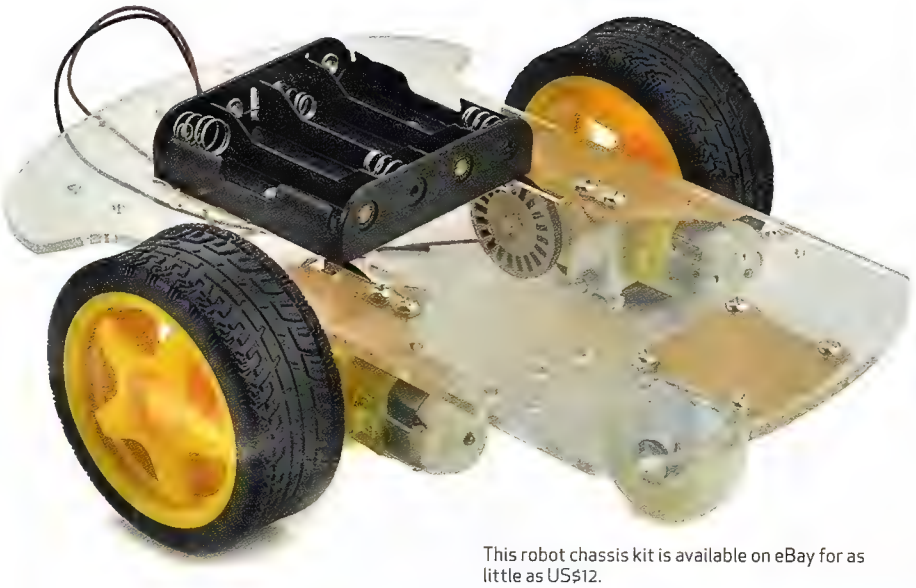
If you're dangerous with a soldering iron in hand, practice before doing this or rope in an experienced mate to help.

STEP 3: WIRE UP THE GM3 MOTORS

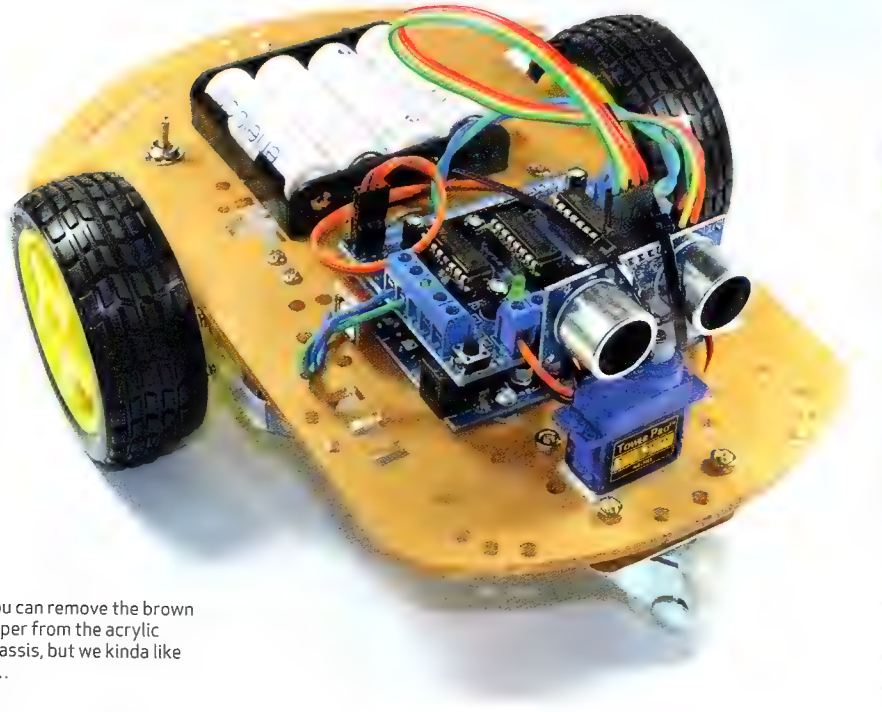
This is probably the step that needs the most dexterity. The tiny connection tabs on these motors are a bit fragile, so don't be rough with them. Also, you'll need to add in 0.1uF capacitors across these tabs – they help reduce the radio-frequency noise generated by the motor brushes and stop it mucking up

THE ROLLY MK. II ROBOT — PARTS LIST

PART	COST PER UNIT	QUANTITY	SOURCE
ROBOT CHASSIS KIT	$12	1	EBAY
ARDUINO UNO R3	$10	1	EBAY, JAYCAR
L293D MOTOR DRIVE SHIELD	$5	1	EBAY
HC-SR04 ULTRASONIC SENSOR	$2	1	EBAY
TOWERPRO SG90 SERVO MOTOR	$3	1	EBAY
4 X FEMALE-TO-FEMALE JUMPER WIRES	$2	1	EBAY (ONE PACK)
DPDT TOGGLE SWITCH	$2	1	EBAY, JAYCAR
SCOTCH/3M MOUNTING TAPE	$7	1	BUNNINGS, MITRE 10 ETC
16-METRE HOOKUP WIRE PACK	$5	1	JAYCAR
0.1UF/50VW CERAMIC CAPACITORS	$1	1	JAYCAR
120MM CABLE/ZIP TIES	$1	1	EBAY, JAYCAR, BUNNINGS ETC
DIP PIN HEADERS	$1	1	EBAY, JAYCAR
TOTAL COST	$51		



This robot chassis kit is available on eBay for as little as US$12.



You can remove the brown paper from the acrylic chassis, but we kinda like it...

the Arduino and shield. Ceramic capacitors are cheap and do the job — polypropylene caps work too, but they're much more expensive.

Try to keep your wiring reasonably tight and measure the wire length to each side of the motor shield terminals. Another tip, twist the wires together as a pair — this will also help reduce noise.

STEP 4: SET UP THE SERVO MOTOR

It's quite common to see one or two HC-SR04 ultrasonic sensors fixed to the front of a rolling robot, but we figure mounting one to the top adds a bit more character. In the Mk. I, we used double-sided tape to hold the sensor to the servo. For Mk. II, we're recommending cable ties. Use the straight-edge arm from the servo motor accessories bag and align each arm under one of the sensors. Use a cable tie to wrap under the arm either side of the centre mounting point, up around the back of the printed circuit board either side of the four-pin header. If you place the edge of the arm against the 4MHz crystal (the metal pill-like object at the bottom of the sensor circuit board), you can clamp it so that the ultrasonic sensor is sitting flush against the servo motor arm. Pull the cable ties tight, but not too tight — you want just a little flexing in the servo arm. Next, attach the servo motor arm to the motor shaft but don't screw it down just yet.

The last thing for the servo is to attach it to the chassis (double-sided tape for the moment) and connect the three-pin plug into the servo header pins on the shield — use the SERVO_2 (servo motor 2) input (note the polarity from the block diagram).

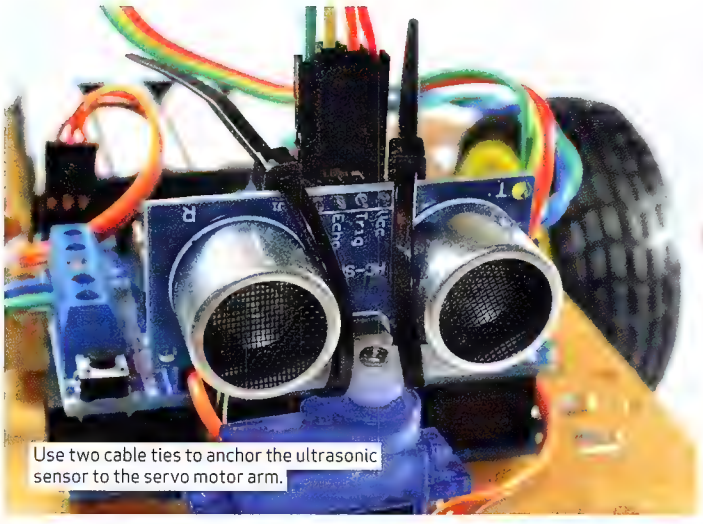
While the servo motor comes with its own three-pin jumper cable, you'll need a four-pin female-to-female jumper cable for the ultrasonic sensor. You can buy a pack of these on eBay for $2 or so — just carefully peel off four wires. These make detaching the sensor much easier than soldering wires into place.

STEP 5: SETTING UP THE MOTOR DRIVE SHIELD

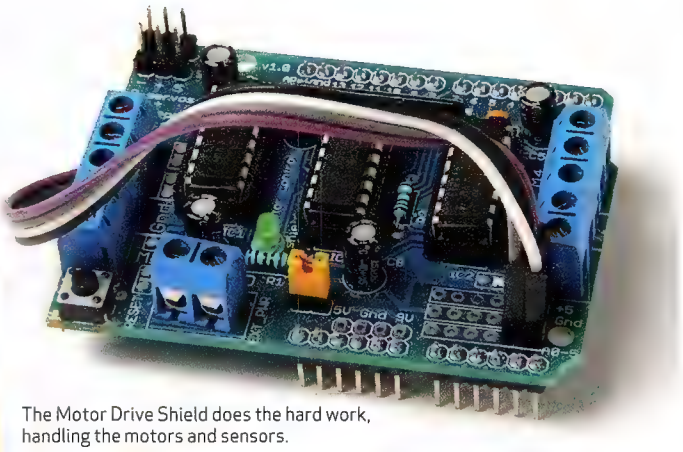
We love this shield because it makes building a robot easy. For this project, you don't apply any power to the Arduino directly — we connect it to the Motor Drive Shield instead via the power switch to the EXT_PWR terminal pair on the shield. Make sure you get the polarity right — positive wire to the '+M' terminal, black to ground (GND).

Right next to the terminal block, you should see a yellow jumper header with PWR written above it. This jumper links power from the shield to the Arduino — if the jumper header is missing, you can buy them as a pack of 10 from Jaycar (cat. HM3240) for $2 or so.

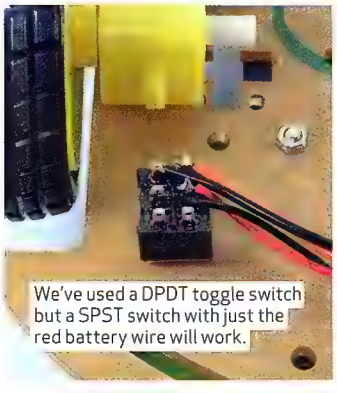
Use your hookup wire to connect the GM3 motors to terminal block pairs M1



Use two cable ties to anchor the ultrasonic sensor to the servo motor arm.

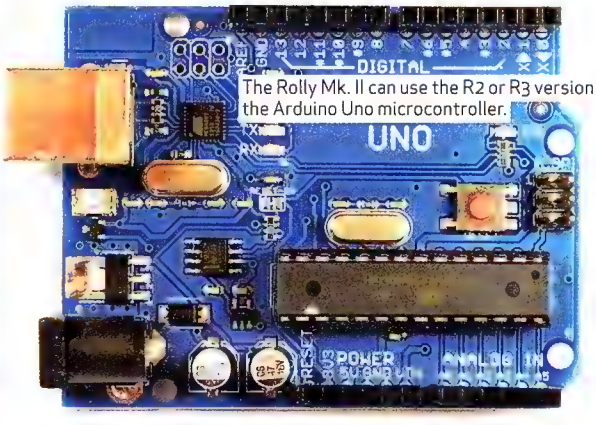


The Motor Drive Shield does the hard work, handling the motors and sensors.



We've used a DPDT toggle switch but a SPST switch with just the red battery wire will work.

Some kits use brass spacers to raise the universal front wheel; others don't.



The Rolly Mk. II can use the R2 or R3 version of the Arduino Uno microcontroller.

and M4. Don't worry too much about the motor polarity at this stage – we'll fix that during the testing phase.

STEP 6: ADD THE POWER SWITCH

We recommend a SPST toggle switch, so again, grab some hookup wire, cut a short length just comfortably long enough to go from the switch to the '+M' terminal on the EXT_PWR block input on the motor shield. Solder the red wire from the battery holder and one end of your hook-up wire to the switch's tags and use the screw clamp to anchor the other end into the '+M' terminal. Finally, do likewise with the black wire from the battery holder to the negative terminal on the EXT_PWR terminal block. (We've used a DPDT (double-pole/double-throw) toggle switch to switch both battery leads – its complete overkill but we're fans of using whatever you have in your 'junk box'.)

Either way, whether you use an SPST or DPDT switch, polarity is vital here – reversing the polarity to the shield will likely blow up it and the Arduino.

STEP 7: LOADING UP THE SKETCH

Grab the sketch from our web site. It's designed for Arduino IDE version 1.0.5. Unzip the file, copy the contents of the libraries folder into the /libraries subfolder of your IDE folder and load the .ino file into the IDE. Next, connect the board via USB, select the Arduino Uno R3 and the correct COM port for your board and finally, upload the sketch to the Arduino.

STEP 8: TEST DRIVE

Do a last once-over of your wiring to make sure everything is where it should be. When you're ready, load in four fresh AA batteries, flick the power switch and see what happens.

First up, the servo motor and sensor should align so the ultrasonic sensor is facing forward. If not, turn off the power and reposition the mount arm on the servo motor so that it does. Turn it back on and while the servo motor will 'wriggle', the sensor should now face forward. If so, install the tiny self-tapping screw into the centre of the arm down into the shaft to lock it in place.

Provided you have a clear path forward, the Mk. II's first movement should be briefly forward before its direction sensing takes over. If it turns in left-hand circles, make sure your wiring is correct – it's possible the left motor wire pair will be reversed. If you get right-hand circles, try reversing the right motor wiring.

STRAIGHT LINE RUNNING

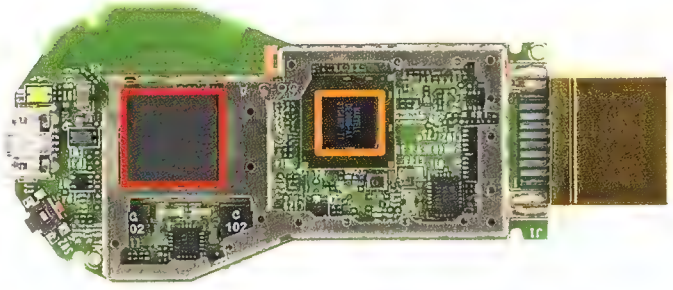
Now some chassis kits will also include two circular slotted discs – these 'encoder wheels' fit over the inside motor axle and allow us to correct straight-line drift. However, since not all kits seem to include them, we'll look at these another time.

Still, once Rolly Mk. II is up and running, you'll want to make sure he's running as straight as possible. Without the encoding wheels, we have no way of creating the 'negative feedback' or correction necessary for it to happen automatically. That means you'll need to do it manually by changing the code in the marked area to adjust the motor speeds so they're both equal. All things going well, you should really only need to do this once.

These GM3 gearbox motors are hugely popular and turn up everywhere – but they come in a number of gear ratios. The chassis kits we've seen include the 1:48-ratio version – these move quickly, but won't have much torque to climb over (or bash through) obstacles. That means they need to be set at near-to-full speed to ensure they don't stall. We'd suggest purchasing a couple of 1:120-ratio motors as replacements rather than slowing the PWM speed too much if you want a slower bot.

HAPPY ROLLING!

If you get this far, congrats! You've just built yourself an autonomous robot. Now, it's your turn – try modifying the sketch and seeing what else you can make Rolly Mk. II do, or maybe even think about adding new features. Your imagination is the only limit! We'd love to hear what you get up to, so drop us a line at **apcmag@futurenet.com**



iFixit.com's teardown finds a Marvell 88DE3005-A1 single-core CPU inside Chromecast.

The Chromecast alternatives

Everyone is talking Chromecast, but it's not the only way to wireless streaming nirvana. Darren Yates begins his look at alternatives already available.

There's been a fair bit of talk about Google Chromecast finally making it onto Australian shores. For some fans, this will be big news, but really, Chromecast is only one way to get your local store of movies, TV shows and music (or YouTube and Netflix for that matter) onto your big-screen TV. The fact is, there are a number of Android-ready alternatives available right now – which one you use depends on your needs, your content and your budget.

ALTERNATIVES ABOUND

If you're not sure what all the fuss is about, Chromecast is a tiny dongle with an HDMI connector on one end and a built-in Wi-Fi adapter that allows you to set up video streaming from web sources, such as YouTube or Netflix, or your local content stash, controlled primarily by your Android phone or tablet. Google released it mid-way through 2013 for just US$35 – but only to a US audience. At time of writing, the local rumour mill had kicked up a gear on whispers it was about to arrive here.

But if you're a long-time reader of *APC*, Chromecast should look, sound and smell a lot like other similar devices we've talked about since mid-2012 – Android-powered mini PCs. The difference is while Chromecast is a limited-function device, a mini PC is a no-holds-barred Android computer that not only handles media streaming but games, web browsing and anything else Android you want it to do.

CHROMECAST HARDWARE

The Chromecast dongle is built around chipmaker Marvell's 88DE3005-A1 single-core ARM Cortex SoC (system on a chip) processor, 2GB of on-board flash, 512MB of DDR3 RAM plus a 2.4GHz 802.11n Wi-Fi module from AzureWave. With built-in video decoding for H.264 and VP8, the SoC isn't too dissimilar to Broadcom's BCM2835 chip that powers the popular Raspberry Pi.

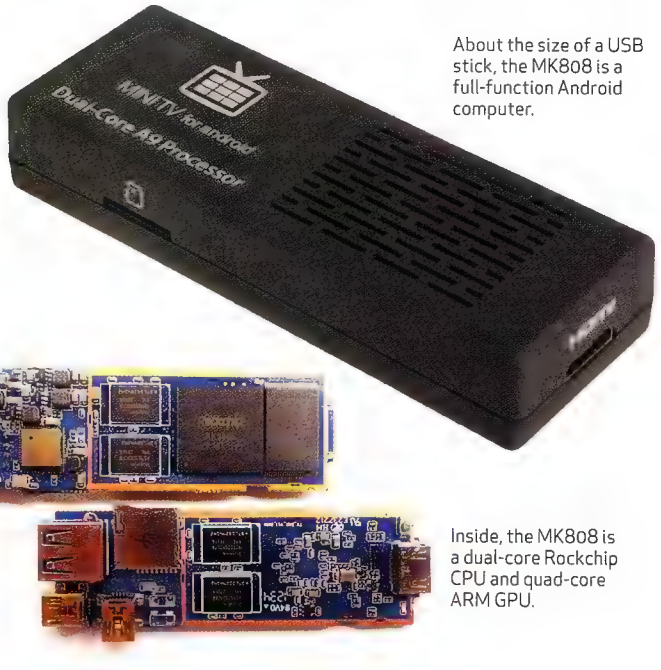
While Android is known for running on a gazillion tablets and phones, it also powers this versatile sub-class of Android-powered mini-PC devices that seem to fly under everyone's radar. Part of the reason for that, at least for the lack of attention from the big-name brands, has to be their low prices. A single-core Chromecast dongle may well sell for only US$35, but you'll find

WARNING

Revert DNS settings after watching Netflix.

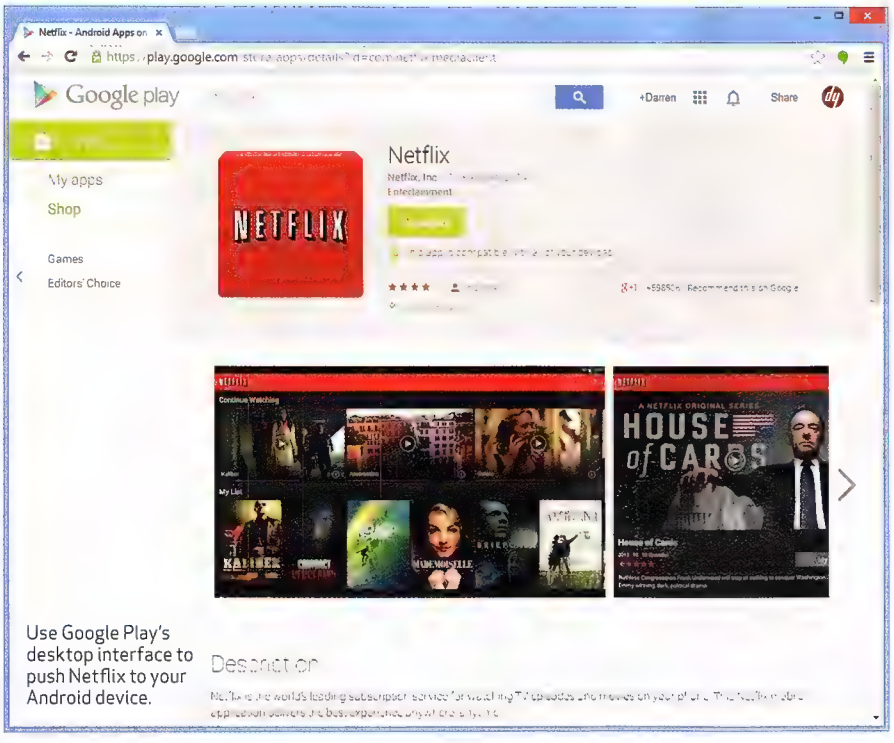
Because you're now effectively re-routing all net traffic on your device through **Unblock-us.com**, we recommend you revert your device's DNS settings back to original before you do any sensitive stuff like online shopping or banking. We don't have anything against **Unblock-us.com**, we just think it's a wise and prudent precaution. And don't forget to reboot.

The J22 features a quad-core RK3188 SoC CPU and dual antenna for around $60.

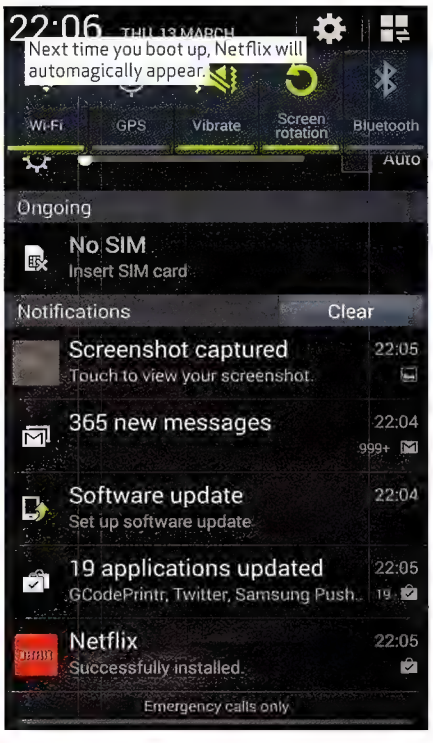


About the size of a USB stick, the MK808 is a full-function Android computer.

Inside, the MK808 is a dual-core Rockchip CPU and quad-core ARM GPU.



Use Google Play's desktop interface to push Netflix to your Android device.



dual-core mini PCs on eBay going for US$45 and quad-core models for under US$60. US PC giant Dell is the only major brand to put its name to a mini PC so far, launching the Dell Wyse Cloud Connect in January 2014.

MINI PC HARDWARE

Since its launch in mid-2012, the mini PC ecosystem has fragmented into three formats – USB stick-style dongles, micro desktop PCs/TV set top boxes and barebones all-in-one motherboards. But what they all have in common is Android.

The USB-stick dongles are the most suited for media streaming – compact, lightweight with multi-core horsepower starting from under $50. They'll usually come with Android Jelly Bean OS up to 4.2.2, 8GB of on-board flash, microSD expansion for another 32GB, 802.11n Wi-Fi, HDMI output and up to 2GB of RAM to play with. Essentially, you're talking hardware equivalent to entry-level tablets such as Samsung's smaller Galaxy Tabs.

Throw in a type-A USB host port, your own USB hub, keyboard, mouse and you have a mini Android computer for under $50 with a great deal more horsepower than a Raspberry Pi.

Despite their relatively unknown status in Australia, mini PCs are doing brisk business in Asia where Chinese chipmakers Allwinner and Rockchip have the market virtually sewn up. One of the more popular models is the MK808 – a solidly-built USB stick-style mini PC with Rockchip's 1.6GHz RK3066 dual-core ARM Cortex A9 CPU and quad-core ARM Mali-400 GPU (the same GPU inside the Samsung Galaxy S3 phone). Having been around for the last 18 months, the MK808 comes in various guises with Android 4.1 or 4.2.2 preloaded and full access to Google Play, giving you near enough to a million apps to load and play.

NETFLIX WITHOUT CHROMECAST

One of the key features that helped Chromecast fly out of the blocks on its US launch was a free three-month subscription to US streaming service Netflix. In fact, so popular was it that Google canned the subscription deal after just 24 hours.

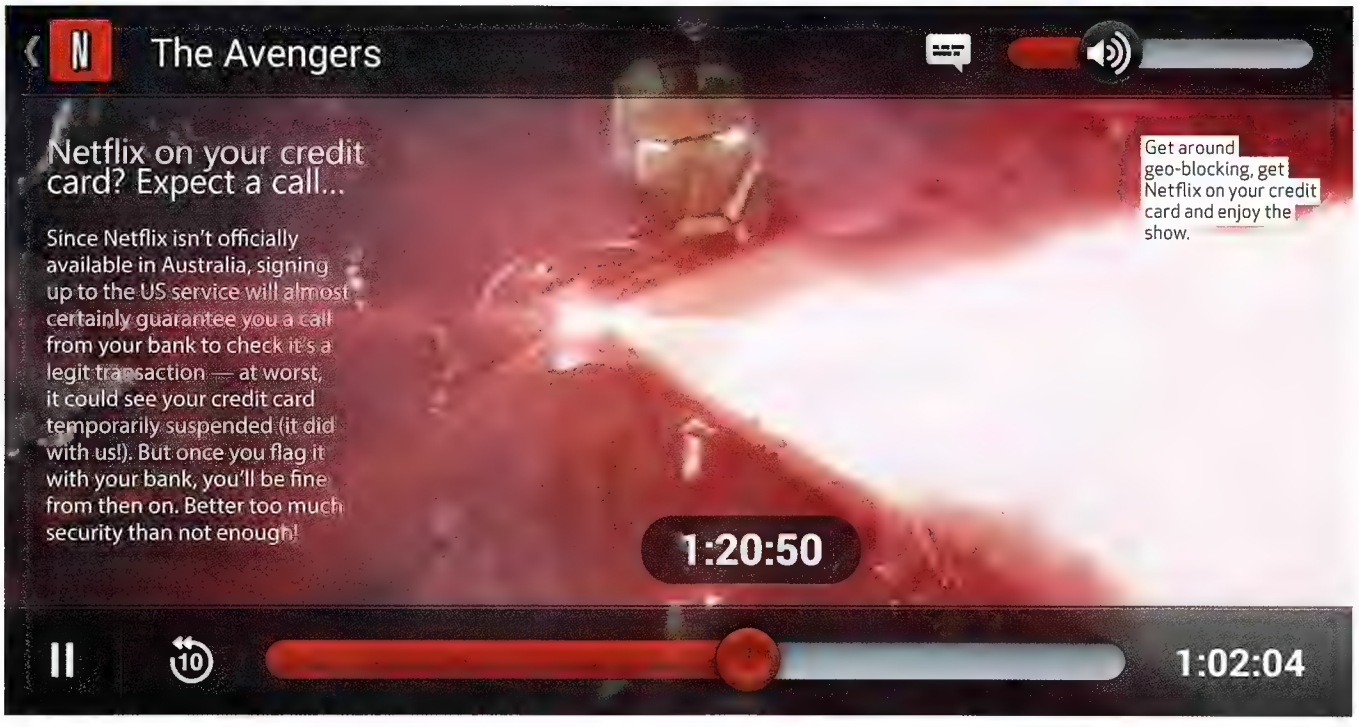
However, with neither Chromecast nor Netflix officially in Australia at time of writing, you'd be forgiven for thinking that's where the story ends. But it doesn't, not by a long shot – you can watch Netflix here in Australia right now streamed from your ADSL modem over Wi-Fi. From there, you can watch it on your TV using an Android-powered mini PC via HDMI, or on your Android smartphone or tablet.

But you can go a step further and watch it via your Galaxy S3 and S4 phone (very likely the S5 and Galaxy Notes as well) on your TV without any cables in sight. You can even use the phone as a remote control if you like, pausing video, setting the volume, and choosing content.

After setting up **Unblock-us**, use Screen Mirroring to find your Miracast dongle.

Setting up Netflix on MK808 mini PC

While the MK808 and other mini PCs may or may not have Miracast capabilities (depending on the model you buy and the OS version it's supplied with), you can still get it playing Netflix on your TV. Just follow steps 1 to 4 in our 'Netflix without Chromecast' guide, the 'Setting up Android's DNS' guide to redirect to **Unblock-us.com** and connect it using an HDMI cable where appropriate.


The Avengers
Netflix on your credit card? Expect a call...
Since Netflix isn't officially available in Australia, signing up to the US service will almost certainly guarantee you a call from your bank to check it's a legit transaction — at worst, it could see your credit card temporarily suspended (it did with us!). But once you flag it with your bank, you'll be fine from then on. Better too much security than not enough!
Get around geo-blocking, get Netflix on your credit card and enjoy the show.
1:20:50
1:02:04

Chromecast is a great idea — but do you really need it? We don't think so. Here's what you do:

STEP 1: SIGN UP TO UNBLOCK-US.COM

Netflix in Australia suffers the curse of geo-blocking, digitally blocked to Australian IP addresses. However, **Unblock-us.com** is just one of a number of online VPN-like services that can make your computer appear as though it's somewhere else.

Once you sign up, you point your network DNS addresses to the **Unblock-us.com** settings and presto — your computer now looks for all intents and purposes as though it lives in the US, the UK or anywhere you choose that **Unblock-us.com** supports. It costs just US$4.99 a month but the good news is you get a 7-day free trial to test it out.

STEP 2: GET GOOGLE PLAY TO PUSH THE NETFLIX APP TO YOUR PHONE

Trying to install Netflix via Google Play on your smartphone in Australia is usually an epic fail. The Google Play app has IP address recognition — you can even head to **play.google.com**, search for Netflix and all you'll see is a bunch of third-party ancillary apps. But if you head straight to the actual Netflix app page on Google Play (**play.google.com/store/apps/details?id=com.netflix.mediaclient**) from your PC, not only does it appear, you can direct Google Play to install Netflix to any of your compatible Android devices. Just click on the Install button under the app title, select your chosen device and the next time you boot that device, down comes the Netflix app.

STEP 3: SET YOUR DEVICE TO UNBLOCK-US.COM

But getting the Netflix app onto your Android device is just the first stage. The app also appears to have IP address recognition and won't even start if it recognises an Australian local IP address. So the next step is to get your Android device pointing to **Unblock-us.com's** DNS IP addresses. If you don't know how, it's only slightly more complicated doing this on Android than your PC — just follow the 'Setting Android DNS addresses' guide opposite.

Netgear's PTV3000 Miracast dongle works great with Samsung's Galaxy S3.

STEP 4: JOIN NETFLIX

Now your Android device is pointing to **Unblock-us.com**, your next step is to sign up to Netflix. It'll normally cost you US$7.99 a month, but new subscribers get the first month free. Even so, you'll need a credit card — we've successfully used NAB MasterCard and Commonwealth Bank cards to sign up. The one trick you need to remember is that Netflix needs a valid US postcode, but don't use '90210' — we recommend using '19706' instead as the US state of Delaware has no sales tax.

Once you're in, pick a movie or TV and enjoy!

Is this all strictly legal? Well, consumer group CHOICE believes Australians should be given the opportunity to get around geo-blocking (and so do we), but the legality of bypassing geo-blocking hasn't been tested in the courts. We can't imagine too many companies are willing to be the first seen to crack down on consumers, so it might be a while yet before that happens. That said, since Netflix doesn't officially stream content to Australia, you're very likely breaking its terms and conditions — but according to a report in *The Australian* newspaper in March 2014, Netflix has between 50,000 and 200,000 Australian subscribers, so you'll be in good company if you are a 'T&C breaker'.

STEP 5: SET UP A MIRACAST DEVICE

If you're happy watching Netflix on your smartphone, or even using an MHL (Mobile High-definition Link) or similar wired connection to your TV, you're done and dusted. But if you want to wirelessly stream your Netflix content to your TV, there's one more step.

Miracast is a wireless HDMI service built into Jelly Bean/Android 4.2 and newer releases under various names such as 'AllShare Cast', 'Wi-Fi Direct' and 'Miracast'. Provided your device also has the right hardware, it allows screens and media content to be streamed to suitably-enabled devices – at video speeds.

The Galaxy S3 smartphone originally sold with Android 4.0.4 but Samsung began including its own AllShare Cast feature from its Jelly Bean/4.1 update (now called Screen Mirroring since Jelly Bean/4.3). What's more, it's compatible with Netgear's tiny $60 PTV3000 Push2TV Miracast adapter. The PTV3000 is dead-easy to use – plug the USB power adapter into one port and an HDMI cable from your TV into the other. Flick your TV to the appropriate HDMI input and you should see the PTV3000 boot up.

If you've flashed a custom Jelly Bean/4.2 or later ROM onto your Android device and it now says it supports 'screen mirroring', there's no guarantee it actually does as it may not include the device driver code for your device's Wi-Fi adapter to make it work – that's the reason why I down-graded my Galaxy S3 from a custom KitKat/4.4 ROM back to 'stock' Jelly Bean/4.1.2.

With your Miracast dongle in place, go to your Galaxy S3/S4 (the S5 should work as well), head to Settings, scroll down and tap on AllShare Cast/Screen Mirroring/Wi-Fi Direct and allow it to search for new devices. When it finds the PTV3000, tap to link to it – it's pretty much just like pairing up to a Bluetooth device.

Once it pairs, you should now see a mirror of your phone's screen on the TV after a few seconds. Launch the Netflix app and sign in. Pick a movie or TV show and it should start playing – on both the device screen and on your TV. You'll see a small delay between the two, but that's normal and you should still be viewing true video frame rates.

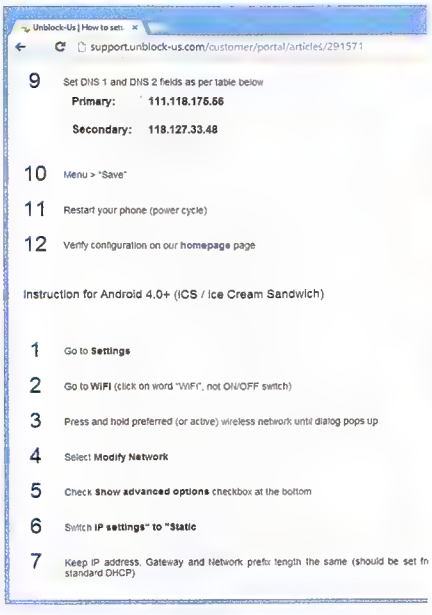
The PTV3000 supports Miracast, Wi-Fi Direct and Intel WiDi display mirroring so depending on your device, there may well be more than one way to get wireless HDMI working. There are some online reports that not all Miracast-enabled devices are compatible with one another – we've reported the success we've had. But at the very least, unless your Android device specifies otherwise, you'll need Android 4.2/Jelly Bean installed to have screen mirroring available.

If you get this far, congrats – you're now streaming Netflix to your TV using Wi-Fi via your phone with no interconnecting cables. Who needs Chromecast anyway?

Setting Android DNS addresses

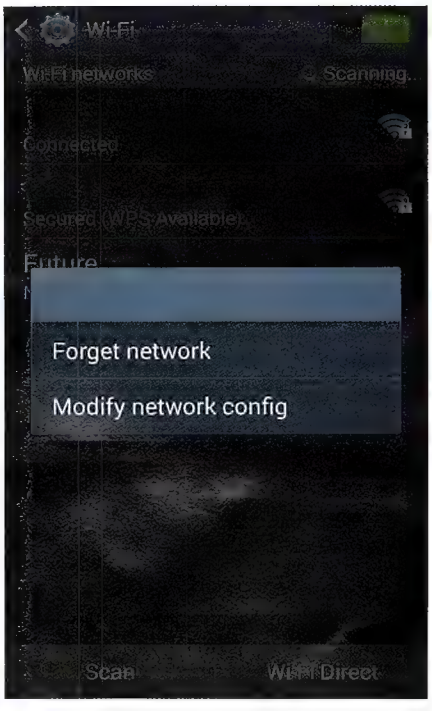
Ready, set... watch!

NOTE: This method should work with any Android device (phone, tablet or mini PC) with at least Ice Cream Sandwich/4.0.3.


Unblock-Us | How to set:
support.unblock-us.com/customer/portal/articles/291571
9 Set DNS 1 and DNS 2 fields as per table below
Primary: 111.118.175.56
Secondary: 118.127.33.48
10 Menu > "Save"
11 Restart your phone (power cycle)
12 Verify configuration on our homepage page
Instruction for Android 4.0+ (ICS / Ice Cream Sandwich)
1 Go to Settings
2 Go to WiFi (click on word "WiFi", not ON/OFF switch)
3 Press and hold preferred (or active) wireless network until dialog pops up
4 Select Modify Network
5 Check Show advanced options checkbox at the bottom
6 Switch IP settings" to "Static
7 Keep IP address, Gateway and Network prefix length the same (should be set fr standard DHCP)

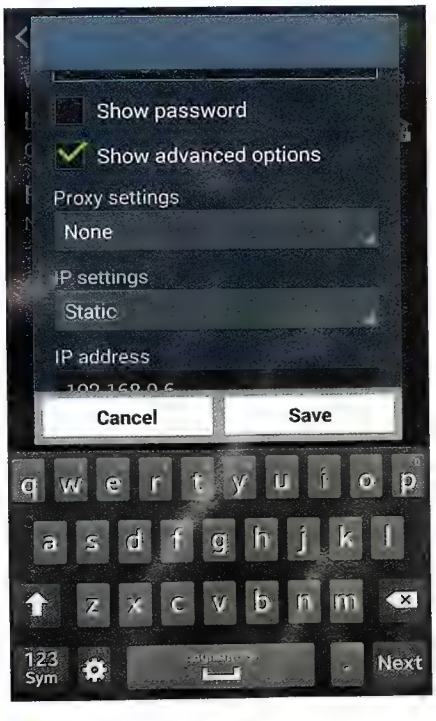
1 GRAB THE DNS ADDRESSES

After signing up to **Unblock-us.com**, click on the 'How To Setup' hotlink on the webpage, scroll down to Android, select it and note the primary and secondary DNS address (111.118.175.56 and 118.127.33.48 at time of writing.)



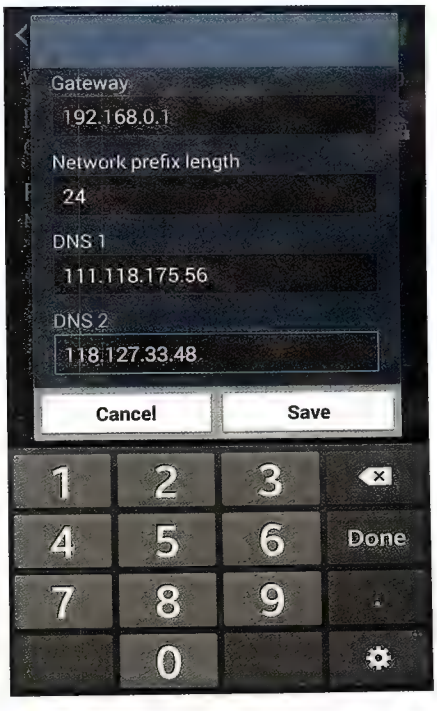
2 CHANGE THE CONFIGURATION

On your Android device, head to 'Settings > Wi-Fi' and long-press on your Wi-Fi network. On the context menu, tap 'Modify network config'.



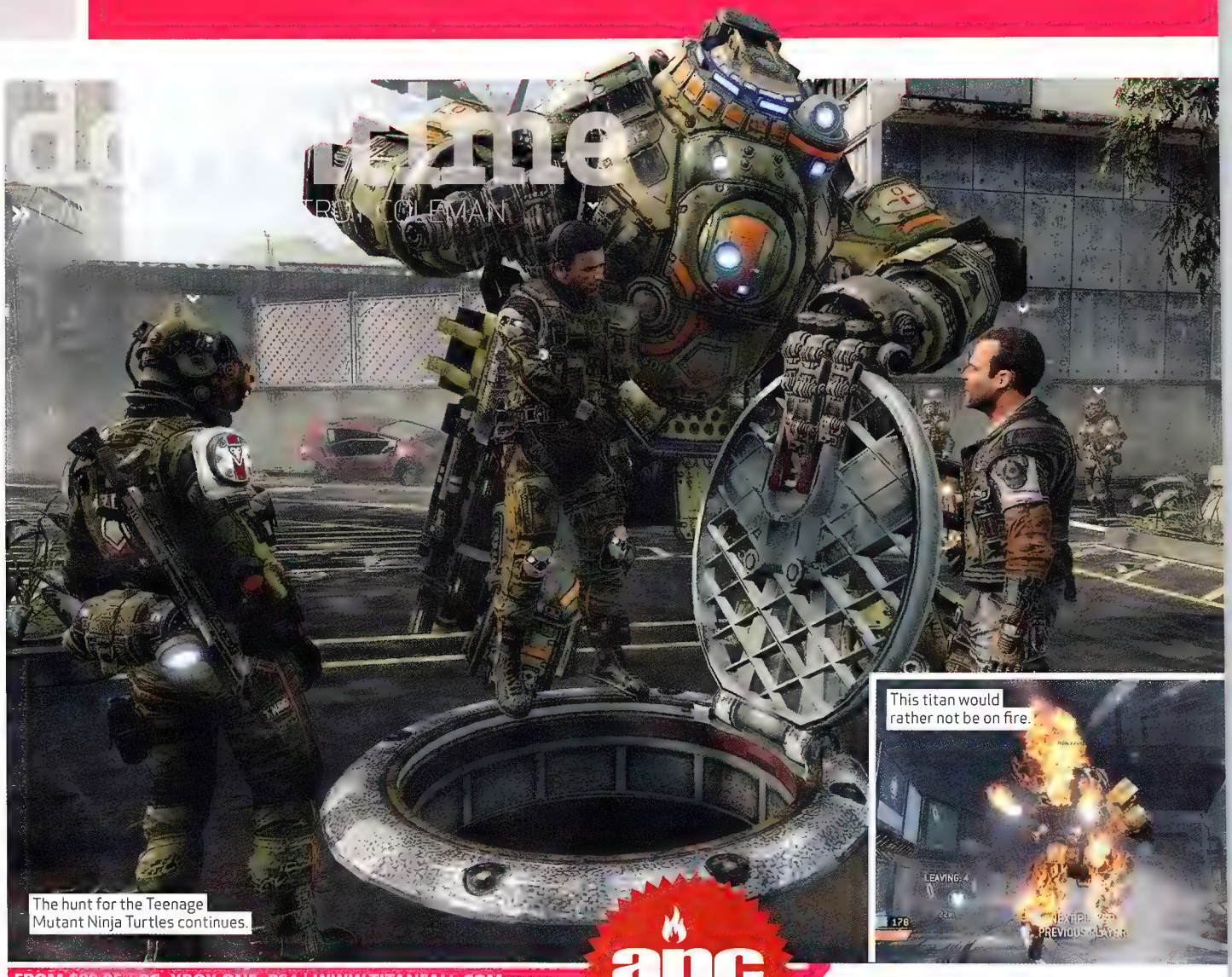
4 SET A STATIC IP

Tick the checkbox next to 'Show Advanced Options', then come down to IP settings and change the box from DHCP to Static.



5 SWAP OUT OLD FOR NEW

Write down your existing IP addresses for DNS 1 and DNS 2 before replacing them with the **Unblock-us.com** addresses noted in Step 1. Save, exit and reboot.



The hunt for the Teenage Mutant Ninja Turtles continues.

This titan would rather not be on fire.

FROM $89.95 | PC, XBOX ONE, PS4 | WWW.TITANFALL.COM

apc HOT PRODUCT

Titanfall

Excellent design held back by a stifling structure.

Titanfall is the last place you'd expect to find restraint. This is a big-money multiplayer shooter where robots called titans are summoned from space. It's a game where you'll run up a wall, jet into the air, lock onto a platoon of grunts with your smart pistol and eliminate them all as you land. It's a game where you'll drop a 40-foot titan onto another 40-foot titan just to see if you can.

It's a game where you will do all of these things repeatedly thanks to lean, intelligent multiplayer design. Matches are limited to 12 players split into two teams, and this small headcount is the foundation for all of *Titanfall's* other successes. Lower numbers enable immediate respawns without upsetting the competitive balance, and the dynamic spawn system means that when you die you pop back a short distance from the next big fight.

Titanfall's other features provide plenty of strategic options, and its manageable scope means that you always have the opportunity to use them. This is what the latter *Battlefield* games got wrong. It's great to offer the player interesting objectives, vehicles or weapons, but they mean less if that player spends their time queueing, respawning or running to get to the next firefight.

COMPONENT PARTS

Titanfall's best qualities come from lots of individually well-designed parts operating together. As a footsoldier you always have access to a broad range of movement abilities that turn you into a cross between *Team Fortress 2's* Scout and *Tribes: Ascend's* Pathfinder. You can double jump, zipline and wallrun at will. Wallrunning, for example, speeds you up – it's by chaining together wallruns without stopping that you build up titan-beating momentum. In the same way that a good *Tribes* player learns to see each hill as a component part of a longer route, so *Titanfall's* city blocks eventually start to look like inviting, freeform obstacle courses.

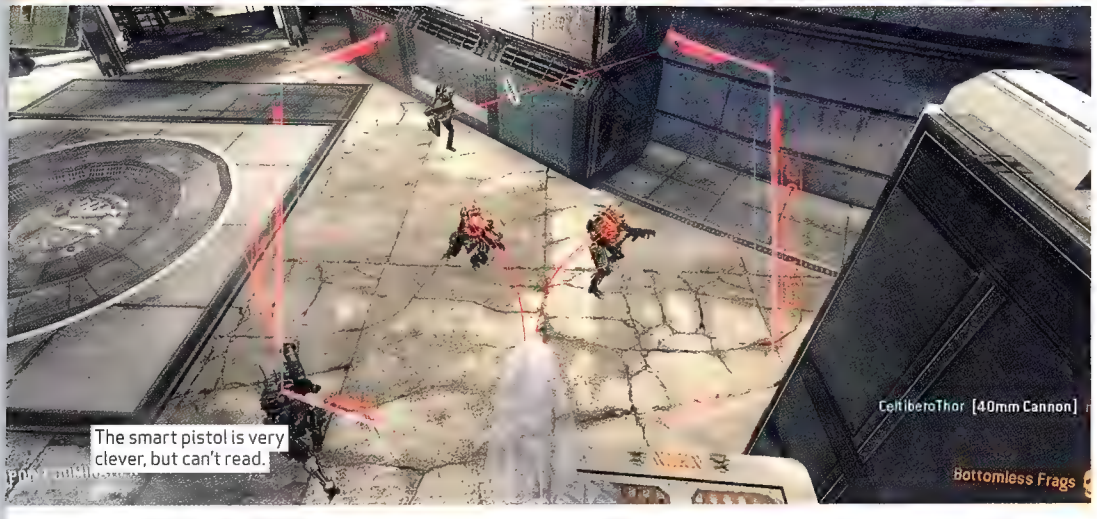
How you choose to use your special abilities alongside your mobility is up to you. You might be a sniper who uses freerunning and a cloaking device to escape when your vantage point is discovered, or a close-quarters brawler who uses stims for a speed and health boosts.

In each case you'll also be making decisions about whether to hunt other players or stop to kill the platoons of NPC minions that spawn throughout each match. At first, the AI cannon fodder seems like a way to counterbalance the reduced player count, but they actually function like creeps in *Dota 2*. 'Farming' is a legitimate strategy, and some teams may equip one player with a minion-slaughtering smart pistol so that they can be the first to bring a titan into play.

How they choose to kit out and use that titan is entirely up to them. Placed on auto, a sturdy Ogre could hold a capture point

Pop the dropship for bonus points as the winning team.

You can hitch rides on friendly titans.



The smart pistol is very clever, but can't read.

in Hardpoint Domination mode. Alternatively, an auto-titan with a projectile-deflecting Vortex Shield could be led through the streets to expose the enemy to a flanking assault by on-foot pilots. Then again, you might prefer to take charge yourself, nipping at the enemy in a nimble Stryder chassis equipped with quad rockets.

You can also tweak your experience with 'burn cards' – disposable unlocks that enable you to access certain bonuses for one life only. They scale in power with rarity – the most basic allow you temporary access to weapons you haven't unlocked yet, and the most advanced grant you instant titans, reveal all enemies on your minimap, or grant you a permanent cloak when you stop shooting.

There are 14 maps, offering a mixture of open and urban environments – the former being the preserve of titans, and the latter offering cover for on-foot pilots. One map, set in a prison, links open courtyards with sweeping internal roadways at multiple levels of elevation, giving titans rare access to the game's vertical dimension. Another, a smuggling outpost, mixes complicated nests of buildings with a wide-open bay area where titans can spar in the shallow water.

Texture quality and character detail fall below modern standards when viewed up close, but they are compensated by unfaltering 60 fps at 1080p and phenomenal animation.

WORLD OF TITANS

Most of your time is spent in traditional multiplayer, which is divided into five modes. Minions, hackable turrets and titans are common to all five, but one – Last Titan Standing – is remarkable for working more like *World of Tanks* than regular *Titanfall*. Each player spawns inside a custom mech, and whichever team is able to destroy all of the enemy's titans is the winner. This turns *Titanfall* into a class-based vehicle game of sorts, where interactions between titan abilities become more important than in other modes.

Then there's the campaign – a narrative strung out across nine multiplayer missions that alternate between Hardpoint Domination and Attrition mode. Beyond the narrative context provided by intro and outro sequences, these missions play much like any other match. This is a smart refocusing of the genre on its key strengths. That said, some players will miss having something to play while they're offline, and who will be frustrated by the way *Titanfall* casts you as an anonymous soldier in a story that is played out in voiceover by characters you're never personally involved with.

AMONG GIANTS

Had *Titanfall* been released 15 years ago, I suspect we'd be talking about it today in the same hushed tones reserved for games like *Tribes 2* or *Team Fortress 2*. Its weaknesses are a product of its structure, not its design; where the latter is characterised by admirable restraint, the former is held back by lamentable restrictions.

The notion of the shooter as an MMOish 'service' manifests in ugly ways. There's no LAN or offline support of any kind. You can form a party with your friends and queue for games, but you can't create your own private lobbies or dedicated servers. It's also very expensive for a modern PC game – $90 plus a forthcoming $30 season pass if you wish to keep up with the latest maps – and it struggles to make a claim for its long-term viability. There's no support for clans or the professional scene. There are no community features, and their absence holds the game back from attracting the hobbyist shooter crowd. If DLC map packs divide the player base as badly as they did with *Battlefield 3*, I'm not sure that *Titanfall* will be quite the same game in six months.

This is a shame, because the things you do in *Titanfall* are likely to be some of the most exciting things you do in any game this year. It is clearly the work of sharp, analytical designers, and it deserves to penetrate the thick layer of cynicism that traditionally surrounds big budget shooters. I wish that this same intelligence and restraint were evident in the business culture that surrounds it. If you invest in *Titanfall*, make it your mission to track down the stories that emerge when all its systems come together and sing. They are why this genre became so popular in the first place, and *Titanfall* is a fine way to rediscover that attraction. Just get your money's worth while it lasts.

■ Chris Thursten

Verdict

The most exciting multiplayer shooter in recent years, but it's held back by questionable staying power.

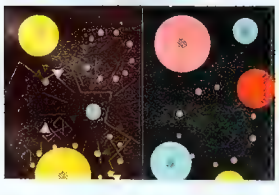
★★★★½

Kahuna

This is a card game that takes a toll.

$2.99 | IOS | ITUNES.APPLE.COM/AU

Kahuna is a one-on-one board game about taking control of territories. Two magical priests compete by creating (or destroying) bridges to tropical islands. Game cards depict specific islands, and can summon a bridge adjoining that respective island. If you control more than half of an island's bridge slots, you place a point token on that island. Points are tallied after each of three rounds — it's a fast game. What makes *Kahuna* so tactical is that tokens are incredibly difficult to protect. Your opponent can destroy all of your plans in a single turn, so anticipating future moves is a must — thoughtful play is rewarded.



Eliss Infinity

Planetary arcade fun.

US$2.99 | IOS | ITUNES.APPLE.COM/AU

Eliss Infinity hurls you into a universe where you must sort planets for obliteration. They appear on the screen and must be manipulated into the correct size to dump in 'squeesars' that wink them out of existence without letting differently coloured planets collide. Odyssey mode's puzzles start simple, but each requires a different approach to succeed. Furious storms and planet-sucking whirlwinds force your fingers to perform an intricate dance, but even the toughest levels are solvable, and *Eliss* is just so perfect for iOS that you won't stop. ■

FROM $69.95 | PC, XBOX360, PS3 | SOUTHPARK.UBI.COM

South Park: The Stick of Truth

Warning: do not play if you are easily offended by farts.

Licensed games haven't had a great track record. More often than not they're shoddy rush jobs, farmed out to a studio's B-team to capitalise on the release of a film or TV show.

The Stick of Truth is an oddity in that it's not only faithful to the material, but good too. It looks and sounds identical to the series, and is just as gleefully offensive. It's also a decent RPG, with rich customisation and slick turn-based combat.

You are 'The New Kid', and have just moved to the not-so-sleepy Colorado mountain town of South Park with your parents.

From the start, most of South Park is free to explore. Wandering its streets and plundering its houses, I was struck by how detailed it was. It's a big space, and nearly every building can be entered, including Tom's Rhinoplasty and South Park Elementary, as well as the houses of all the main characters. The game is dense with jokes and Easter eggs; a lot of love has gone into designing this world.

As you explore your new home, you're drawn into a clash between the humans, led by grand wizard Cartman, and the elves, led by... well, I won't spoil the surprise. Cartman recruits you into his army and you're given a selection of classes to choose from: mage, fighter, thief or Jew. Yes, really. The two factions are fighting over the titular *Stick of Truth*, a mystical artefact of great power that, according to the kids, enables the bearer to the control the universe. But really it's just a stick. The writing is what you would expect from a South Park game. It's crass, it's satirical, and its parodies are keenly observed. Nothing is out of bounds for Matt Stone and Trey Parker, and the game will no doubt stir some controversy.

The combat is where Obsidian's involvement becomes clear. They're the studio behind *Fallout: New Vegas* and *Knights of the Old Republic II*, so they have some decent RPG chops, which is evident in South Park's excellent turn-based combat. There's genuine depth here, with status effects, damage modifiers, stances, buffs, debuffs and customisable gear. Fling a turd at an enemy and you'll inflict Grossed Out status, causing them to keel over and puke, while red-headed enemies' Touch of the Ginger ability lowers your defence. It's snappy, fast-paced and requires some strategic thinking, but bar a few bosses, it can be too forgiving on the default difficulty setting.

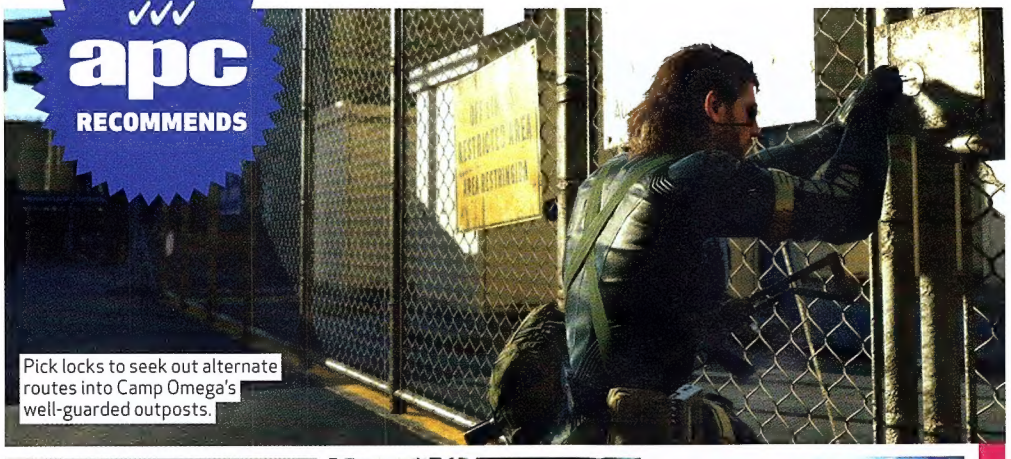
The problem with reviewing *The Stick of Truth* is that I can't really talk about my favourite bits. Being surprised is half the experience, and you won't believe some of the stuff it makes you do. It's puerile, yes, but not in the dimwitted way the execrable *Family Guy* game was. *South Park's* humour has always felt knowing to me, with its tongue wedged firmly in its bum cheeks. The show marries schoolboy fart jokes with dark, witty satire, and the game is no different. The comedy is never at the expense of fun, even when it's dissing gaming clichés. ■

Verdict

A fun, polished, handcrafted RPG attached to a genuinely funny 15-hour-long *South Park* episode.

★★★★½

apc RECOMMENDS



Pick locks to seek out alternate routes into Camp Omega's well-guarded outposts.

$49.95 | PS4, PS3, XBOXONE, XBOX360 | WWW.KONAMI.JP/MGS5

Metal Gear Solid V: Ground Zeroes

Snake's in the rain in a great, but not so Big Boss, prologue.

I finished my first run of *Ground Zeroes* in 65 minutes and 48 seconds. Now admittedly, I'm the madman who's gone through *MGS4* an existence-questioning 16 times. So feel free to add a good half hour to that initial number. Nevertheless, it's hard to escape the reality this is essentially a beefy demo designed to prime you for the bonafide main event that will take place when the full-fat *Metal Gear Solid V: The Phantom Pain* launches next year.

Thankfully, there's plenty of scope for replay – I've spent a good six hours hungrily seeking out every secret the main mission and its five unlockable Side Ops challenges have to offer.

In many ways, *Ground Zeroes* is similar to *MGS2's* legendary tanker demo. As was the case almost 13 years ago, you're still dealing with a grizzled dude skulking around in a downpour, knocking out guards and getting into all sorts of involving stealth pursuits.

What plot setup Kojima provides is surprisingly brief considering the series' love for a codec chinwag or 27. You join Big Boss in the middle of infiltrating Camp Omega, a sodden military stronghold on the southern point of Cuba's coast. Tasked with busting out a young boy named Chico and his friend Paz, you outmanoeuvre the base's 40 or so marines as the new owner of your hero's larynx, Kiefer Sutherland, grumbles under his breath a bit. And yes, the Hollywood thesp sounds exactly like the slightly phoned-in, shouty Jack Bauer you probably expected.

Ground Zeroes represents a radical, and entirely positive, mechanical overhaul of *MGS4*. Since 2008 the sneaking landscape has been reshaped by the likes of *Batman: Arkham Asylum* and *Far Cry 3*; reference points *Ground Zeroes* sensibly takes into consideration.

New features slink their way into the existing systems with reassuring ease. Taking a cue from Brody and Bats, Snake tags and highlights enemies with his binoculars, coating them in a Detective Vision-like glow that makes long-distance reconnaissance a breeze. For the more wonky-thumbed, Koj also introduces Reflex: a slow-mo mode that gives you a couple of seconds to shoot an alerted guard. A concession to modern sneakers, sure, but you thank your lucky La-li-lu-le-lo every time the big hand strikes Bullet Time-'o-clock.

Ground Zeroes is also the most impressive piece of software I've seen running on PS4. Thanks to Konami's snazzy proprietary Fox Engine, the action is presented in glorious native 1080p, all the while shifting along at a smooth 60fps. Don't underestimate that latter number either – it makes Kojima's take on hide-and-seek look and feel supremely responsive, something further helped by a revamped and graceful animation system that makes Big Boss' PS4 debut every inch the next-gen prospect in motion. ■

Verdict

Rich in depth and quality this prologue provides an exciting peek into a potential PS4 classic.

★★★★☆

Tengami

A beautiful pop-up book for grown-ups

$5.49 | IOS | ITUNES.APPLE.COM/AU

This point-and-click adventure takes place in a mythical, dreamlike Japan. It's all cherry blossom groves, abandoned pagodas and gently rolling seas, painted in pastel pinks and blues. Still images are pretty enough, but *Tengami* is defined by the cues it takes from old pop-up storybooks: secret passages are hidden beneath paper flaps, and new areas appear when you turn a page. This conceit isn't just a visual idiosyncrasy, however. Delicately unfolding the world with your finger is satisfyingly tactile, and most of the puzzles involve creating new pathways or searching for clues in the creases and crannies that appear mid-fold. Even when players feel stuck, or realise that solving a puzzle requires backtracking, the world of *Tengami* is a pleasant place to be. The score is particularly evocative, and the environments' meticulous articulations and precision cuts suggest craftsmanship and care. The pop-up book aesthetic pulls the otherwise-standard design and tone beyond their station nicely.

Still, *Tengami* relies too heavily on puzzles typical of larger, older adventure games. Its best moments take advantage of its unique mechanics and atmosphere, but you're often looking for hidden inventory items or counting symbols to plug into combination locks. It's always a little stiff — your character walks slowly, and 'hotspots' dictate when, where, and how the pages unfurl — and its less imaginative puzzles only reinforce how brittle adventure games can be. ■

Chipolata fingers and autocorrect are the enemy of onscreen keyboards.

I can't put my finger on it

Not everybody's happy using the touchscreen keyboard on their smartphone.

Ask Ryan Seacrest, the glitzy DJ and host of US talent shows like American Idol, who was so addicted to the tactile buttons of his BlackBerry for typing that he co-founded Typo, a 'Berry-esque keyboard accessory that clips onto your iPhone. The only problem is, BlackBerry itself wasn't too flattered by the imitation, taking Typo to court for what it claimed was "a blatant infringement against BlackBerry's iconic keyboard". At time of writing, BlackBerry had just won a preliminary injunction against Typo, preventing it from selling any devices, which could be a blow to any big-fingered *APC* readers. Our advice: get a phablet, or opt for speech-to-text wherever possible.

It's best not to keep the iStab in your back pocket.

AND THE WINNER OF 'MOST DANGEROUS IPHONE CASE' GOES TO...

Ah, 3D printing. To think, before you came along, bad ideas remained just that. Ideas. Now, with just a little filament, we can transform those bad ideas into sharp, lethal reality. Ladies and gentlemen, without further ado, we present 'iStab': a 3D-printed iPhone case with built-in folding knife that you can make for yourself in the comfort of your own home. As its description on Instructables reads, the iStab "can be used as a weapon for self-defence for the next time you're in a knife-fight like Michael Jackson in Beat It, or harmlessly used for everyday actions like opening packaging or cutting items to size." Versatile *and* dangerous.

Microsoft agrees not to read your email

After courting controversy when it admitted it had secretly read a private user's Hotmail emails in order to investigate a suspected leak of its intellectual property and trade secrets, Microsoft has now changed tack, agreeing that from now on it won't read our emails anymore.

Even if it really wants to. In a marked change of policy set to address rightly miffed users' privacy concerns, the Windows maker's legal chief Brad Smith now says: "we will not inspect a customer's private content ourselves. Instead, we will refer the matter to law enforcement if further action is required." It's a bold move, given nearly all of the company's competitors maintain the same extremely broad powers over your communications hosted on their services. Will Apple, Google, Yahoo et al now follow Microsoft's lead? We think not.

Anarchy in the UK: DVD-ripping edition

The UK government is updating its copyright laws to allow CD & DVD ripping for personal use (after a survey that found 85% of UK citizens already thought they enjoyed the privilege!). In this era of streaming media and rampant illegal downloading the long overdue UK update might seem almost too late in coming, but this still puts them ahead of us — in Australia we have format-shifting laws, which allows for limited conversion of media between formats, but making digital copies of digital media for personal use isn't covered. (Which is totally fine, really, since DVDs almost never get scratched, do they?)

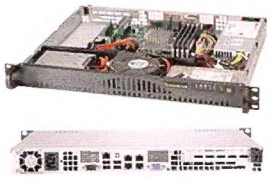
CLOUD SERVER

Pioneer of Innovative Technology

Introducing our new range of cloud server and storage solutions

DreamMicro SOHO Server 1U 5018A-MLTN4 From $849 RRP

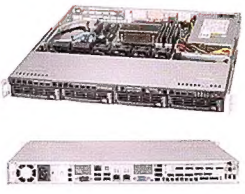
Intel Atom C2550 | 2x FIXED Drive Bays | IPMI 2.0 with KVM over LAN



- Intel® Atom™ Processor C2550
- Up to 64GB DDR3 1600MHz ECC/non-ECC UDIMMs in 4 slots
- 2x 3.5" Fixed SATA3 HDD Bays OR 4x 2.5" SATA2 (optional)
- 1x PCI-E 2.0 x8, 1x PCI-E 2.0 x4 Expansions Slots
- Quad GbE ports, IPMI w/ dedicated LAN
- 200W Low Noise AC-DC Power Supply with PFC

DreamMicro Power Server 1U 5018D-MTF From $1,249 RRP

Intel Xeon 4th Generation | 4x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN



- 1x Intel® Xeon® E3-1200 v3 4th Generation Processor
- Up to 32GB DDR3 ECC 1600MHz UDIMMs in 4 slots
- 4x 3.5" Hot-swap SATA3 HDD Bays
- 1x PCI-E 3.0 x8 (in x16) Full-height Expansion Slot
- Dual Gigabit LAN (1x Intel® i217LM & 1x Intel® i210AT)
- 350W Gold Level Power Supply

DreamMicro Power Server 1U S100-L11D From $1,499 RRP

Intel Xeon 4th Generation | 12x FIXED Drive Bays | IPMI 2.0 with KVM over LAN

- 1x Intel® Xeon® E3-1200 v3 4th Generation Processor
- 4x DDR3 1333/1600MHz ECC UDIMM slots
- 12x 3.5" or 2.5" SATA fixed HDD/SSD bays
- 1x PCIe G3 x8 slot (x 8 signals) Slot
- 4x Intel® I210 GbE RJ45 + 1x Intel® 82599 10Gb SFP+
- High efficiency 400W Power Supply 80 Plus Gold

DreamMicro Power Server 1U S100-X1S1N From $1,149 RRP

Intel Xeon 4th Generation | 4x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN

- 1x Intel® Xeon® E3-1200 v3 4th Generation Processor
- 4x DDR3 1333/1600MHz ECC UDIMM slots
- 4x 3.5" or 2.5" hot-plug HDD/SSD bays + 2x fixed 2.5" bays
- 2x PCIe G3 x8 mezzanine slots (x 8 signals)
- 2x Intel® I210 GbE RJ45 ports
- High efficiency 400W Power Supply 80 Plus Gold

DreamMicro Power Server 1U S210-X12MS From $1,349 RRP

Intel Xeon E5-2600/v2 | 4x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN

- Intel® Xeon® Processor E5-2600/E5-2600 v2
- 16x DDR3 800/1066/1333/1600/1866MHz RDIMM/LRDIMM
- 10x 2.5" or 4x 3.5" Hot-plug HDDs
- 1x PCIe x16 G3 slot for low-profile card or mezzanine
- 2x Intel® I350 1GbE RJ45 ports
- 650W High efficiency fixed Power Supply

DreamMicro Power Server 2U 5027R-WRF From $2,099 RRP

Intel Xeon E5-2600/1600 | 8x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN

- 1x Intel® Xeon® Processor E5-2600/E5-2600/1600 v2
- Up to 512GB ECC DDR3, Up to 1866MHz; 8x DIMM slots
- 8x 3.5" Hot-swap HDD bays
- 4x Full-height x8 & 1x Low-profile x8 slots
- Integrated IPMI 2.0 and KVM with Dedicated LAN
- 500W Redundant Power Supplies Platinum Level (94%+)

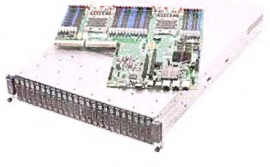
DreamMicro Power Server 2U 6027R-WRF From $2,399 RRP

Intel Xeon E5-2600/v2 | 8x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN

- 2x Intel® Xeon® Processor E5-2600/E5-2600 v2
- Up to 1TB ECC DDR3, Up to 1866MHz; 16x DIMM slots
- 8x Hot-swap 3.5" SAS/SATA HDD bays
- 4x PCI-E 3.0 x8 (2 full and two half length) slots
- Intel® I350 Dual port Gigabit Ethernet Controller
- 740W Redundant Power Supplies Platinum Level (94%+)

DreamMicro Power Server 2U S210-X22RQ From $1,899 RRP

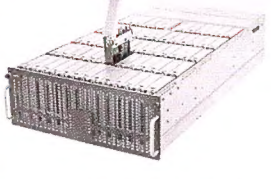
Intel Xeon E5-2600/v2 | 12x HOT SWAP Drive Bays | IPMI 2.0 with KVM over LAN



- 2x Intel® Xeon® processor E5-2600/E5-2600 v2
- 24x DDR3 800/1066/1333/1600/1866MHz RDIMM/LRDIMM
- 24x 2.5" or 12x 3.5" Hot-plug HDDs
- 4x PCIe x8 G3, 1x PCIe x4 G3 low-profile + more
- 2x Intel® I350 GbE RJ45 OR Intel® X540 10GbE Base-T RJ45
- 1100W High efficiency redundant Power Supply

DreamMicro Storage System 4U M4600H From $6,799 RRP

Enterprise storage system | 60x HOT SWAP Drive Bays | Scalable up to 120 HDDs



- Ultra-dense, scalable, cost-effective disk expansion unit
- Supports 60 Hot-swappable 3.5"/2.5", SAS/SATA
- Scalable up to (120) HDDs in cascading
- 2x SAS (SIM) + 4x SAS (ISIM) Interface Modules
- 1x Mini USB management port
- 2x 1400W High efficiency redundant Power Supplies

All prices include GST, exclude freight, all images are for illustrative purposes only. Errors and omissions excepted. Free 1 Year On-site Pickup & Return Warranty, 2 and 3 Years Optional.

· ISO 9001 Quality Endorsed Company QEC11489 · Commonwealth Government Endorsed Supplier 263 · State, Local, Government, Education Contract Supplier

PIONEER COMPUTERS

Build your own dream!

www.pioneer.net.au

1300 883 218 / sales@pioneer.net.au

Unit 2, 37 O'Riordan St, Alexandria NSW 2015 Australia

NSW: (02) 9690 2888 QLD: (07) 3257 3879 VIC: (03) 8790 1830 NZ: (649) 377 0497 Fax: (02) 9690 0333

Dreamcare.com.au

New online service and support for all brands of PCs, Notebooks and Servers.

EPSON
EXCEED YOUR VISION

PRECISIONCORE

Like a Laser. Only better.

- ✓ Up to 50% lower printing costs than colour laser
- ✓ Brilliant professional-quality colour
- ✓ Amazingly fast printing
- ✓ Up to 70% less power than laser

www.epson.com.au/precisioncore